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CONTENTS

Original Communication PAGE

The Value of Bite Analysis in Modern Dentistry, Eliminating Uncertainty and Lack of Planning in the Treatment of the Human Dentition. By GÖSTA LINDBLOM 87

Everyday Procedures in Dentistry

A Closed Mouth Impression Technique for Full Denture Construction. By ALAN MACK, L.D.S.Eng. .. 104

Short Communications

Partial Anodontia. By J. S. SELBY, L.D.S.Sheff. 105

A Case of Costen's Syndrome. By S. P. JOHNS, B.D.S.Lond. 105

A Dentigerous Cyst. By Surgeon Commander (D) L. A. MOULES, R.N., L.D.S.Eng. 106

Editorial

Report of the Central Health Services Council 107

Continued overleaf

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CONTENTS—*continued*

	PAGE
Notes and Comments	
A Well-earned Honour	108
Demonstrations at the Annual Meeting	108
Pay in the Services	109
Australian Standards for Dental Materials	109
The Medical Press	109
Medicine or Toilet Preparation	109
Change of Publication Day	109
Fifty Years Ago	109
Letters to the Editor	
The Piltdown Skull (A. T. Marston)	110
Earlier Eruption of Teeth (R. E. Goodrich)	110
,, ,, ,, (Ernest H. Phillips)	110
The Dental Curriculum ("Banbury Cross")	110
Reviews and Abstracts	110
Public Dental Service	113
Dental News	114
The Schools	116
The Services	116
Obituary	
Hugh Lloyd Williams	116
Charles Kynock Butchart	116
Eric Yates Middleton	116
Thomas William Stark	116
Personalia	116
Our Diary	116
British Dental Journal	116
Supplement	
Association Notices	25
Correspondence	
The Isle of Man School Service (F. C. Shenton)	25
Changes of Address	26
New Members	26
Forthcoming Meetings at Headquarters	26

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ORIGINAL COMMUNICATION

THE VALUE OF BITE ANALYSIS IN MODERN DENTISTRY, ELIMINATING UNCERTAINTY AND LACK OF PLANNING IN THE TREATMENT OF THE HUMAN DENTITION[1]

By GÖSTA LINDBLOM

BITE analysis is, briefly, an examination of the human bite with reference to *articulation* and *stress* which should precede any attempt, whether of major or minor proportions, to restore or reconstruct an individual dentition. Naturally, all other factors associated with the functional efficiency of the bite must also be taken into account, such as incidence of caries, oral hygiene, condition of the gums, nature of the saliva, frequency and distribution of calculus, formation of pockets, suppuration, type of bite, etc. Social factors, too, must be considered, as well as purely medical considerations, about which more will be said later.

However, the premise for the right understanding of this term " bite analysis " and the possibility of applying it in dental practice, is a complete change in our conception of the task of the dentist to-day. The old view that the chief function of a dentist is to carry out local treatment of an isolated tooth or defect in the dentition—accepting, and adapting his work to, the existing oral conditions—has had to be abandoned. The modern dentist must approach his task with the conviction that the final aim of all dental treatment should be to make the *functional* condition of the bite as consistent as possible with the physiological state. The correction of details will then be completely subordinated to the main mission, namely, *restoration of the ideal function of mastication.*

These views were first propounded in America in the period 1916–26, by men such as Stillman, McCall, Keith Box, Bricher, W. Wright, Orton, Schuyler and others, in their lectures on the importance of *balanced occlusion.* The elucidation of the term " bite analysis " therefore requires a definition of " balanced occlusion," or, as I prefer to call it, " balanced articulation."

Those who wish to penetrate the problem more deeply I would refer to my paper : " *The Term Balanced Articulation, its Origin, Development and Present Significance in Modern Odontology*" [5]. In the present context I must confine myself to quoting the following important points from that article:

" Balanced occlusion " or " balanced articulation " was originally confined to a term associated with a certain technical operation in the construction of full dentures. However, it has come to be a cumulative designation for our whole knowledge of the physiological function of the bite. *Occlusion* is the contact between cusps and cusp-planes in the teeth of the upper and lower jaws, when they meet in biting position (static condition). *Articulation,* on the other hand, denotes this contact during the functional movement of mastication (dynamic condition). In both cases we may speak of a normal, traumatic, centric, eccentric, unbalanced or balanced, etc., position or movement.

In speaking to-day about " balanced articulation," the reference is chiefly to the natural bite, and the designation is used as a collective term for the various forces that will be exerted on jaws, alveolar processes and teeth and their supporting tissues during physiological mastication and swallowing movements ; and by balanced articulation is meant such an ideal state of equilibrium during these movements that all teeth will be as uniformly stressed as possible.

These ideas led to an overestimation of the influence of " traumatic occlusion." It is unquestionable that the overstrain upon an individual tooth may exceed the margin of safety optimal for that tooth, in which case the attachment of the tooth in its alveolus will be destroyed ; the tooth will become loose and eventually be exfoliated. But to-day we know that this fact is not the only explanation and cause of periodontal disease ; some other factor must be present—though we must confess that we do not yet know what it is, even if we have approached nearer to the solution. There must

[1] Read at the Annual Meeting of the British Dental Association, Birmingham, July 12, 1950.

be a certain predisposition in some individuals, families and races for this disease. But during the past twenty years, clinical experience as well as experimental research and histological investigations have convinced us that overstrain on an individual tooth or group of teeth, owing to lack of balance in articulation during masticatory movements of the jaws, *may* be a releasing and precipitating cause of a latent disease factor, and that, unless this overstrain is corrected, our local methods of treatment will be frustrated, and a relapse will set in.

Parallel with this development of ideas, the attempts to perfect an articulator capable of reproducing the complicated movements of the human jaws, as well as a method of registering the individual condylar path, had been crowned with success due to the efforts of numerous prominent men such as Bonwill, Gysi and Hanau, and of later investigators such as MacCollum, Stansbery and others.

Thus, by a deeper knowledge of the full denture articulation problem, and the transference of this analogy to the natural bite and its function, we have made a major advance. Some authors, it is true, have denied the possibility of transferring an analogy from the laws of denture articulation to the natural bite, on the grounds that such an ideal equilibrium of articulation scarcely occurs in civilised man except in rare instances, and that a bilateral articulatory balance, which is necessary for stabilising a full denture, does not exist in the human bite. Although this view is correct in principle, it is nevertheless an indisputable fact that the distribution of stress between the individual teeth will be effected best if the laws of articulation, as formulated by Hanau, are observed as closely as possible. We have here to bring the overbite, the height of the cusps and the compensatory curve into harmony with the individual's condylar path and with the laws of articulation. In so doing we feel that we have created the most favourable conditions for the periodontium, thus helping any weakened attachments of the tooth to withstand the stress associated with mastication in a case of predisposition for periodontal disease. In the light of these laws of articulation it will be easier for us to understand that complete articulatory equilibrium will occur only

(1) when the vertical dimension (usually called the height of the bite) is correct ;

(2) when the incisal overbite and overjet are correct ;

(3) when the occlusal details of the teeth of one jaw are in full harmony with those of the opposite jaw, both in a position of rest and during masticatory movements ; and

(4) when the two condyles lie and move symmetrically in their respective fossæ.

It will also be readily understood that if, owing to loss of one or more teeth, an irregularity has been created in the occlusal curves, the guidance of the mandible by these occlusal details will not correspond to the guidance directed by the two condylar paths in their joints, and one of the following possibilities will occur.

(1) The displaced tooth, or teeth, will act as an impediment to the movement of the jaws—usually called cusp-trauma—with resultant overloading of such teeth due to unilateral stress. If this overload exceeds the margin of safety of the relevant periodontium, or if the latter's resistance is lowered by a factor predisposing to periodontal disease, the result will be a breaking down of the periodontal membrane, and in due course the loss of the teeth involved. If, on the other hand, the stress does not exceed the safety margin of the periodontium, the reparative power of the body will be capable of strengthening the attachments of the relevant teeth—compare what happens in orthodontic treatment.

(2) Any existing incongruity between the tendency of the lower jaw to be directed by the temporomandibular joint itself and by individual tooth-impediments may cause disturbances in the articular function, leading to what are usually called " temporomandibular arthroses." In such cases, too, a certain predisposition seems to be necessary if the disease is to develop.

(3) The third—and most desirable—possibility is that none of these diseases will occur.

Having regard to the foregoing, as well as the very complicated movements of the mandible due to the complex mechanism of the temporomandibular joint, we are led to another logical corollary: "The human mouth is *not* the best articulator." To clarify this statement I would refer to my work on balanced occlusion [1], in which I pointed out that when a mouth is closing in "centric occlusion," the lower jaw *may* be directed into a false position, due to the presence of cusp traumata. I therefore called this position *habitual centric occlusion*, and it is made possible by the resilience of the temporomandibular joints. *True centric occlusion* can only be acquired when the mandible is in the relaxed rest position ; that is to say, hanging loosely in the relaxed muscles. That is why this position has also been called the relaxed centric relation. From there the mandible goes into the correct physiological occlusion only when all occlusal details are in harmony with the laws of articulation ; in other words, no cusp trauma must be present.

Diagnostic Technique

To detect such an impediment in the occlusal curves of a case, it is therefore necessary to mount study casts of the relevant dentition in an individually adjustable articulator so as to disclose the offending tooth or teeth. Since time does not permit of a detailed description of the mounting and registration technique, I will confine myself here to a brief outline.

(1) The upper study model is mounted in the articulator by face-bow transfer.

(2) A relaxed centric relation record is taken intra-orally with soft wax interposed between the two jaws. The patient is instructed to bite gently into the soft wax, and is stopped before any occlusal details come into contact with each other.

(3) After chilling the wax record, the lower model is mounted in the articulator.

(4) Condylar path registration is carried out in the usual way.

(5) On removal of the centric wax record and closure of the articulator, the occlusal details will guide the two models into habitual centric occlusion ; and if cusp impediments exist, the operator will be able to detect the source and also observe a displacement in the condylar mechanism of the articulator. By scraping or grinding those cusps or cusp planes on the models that act as impediments, the occlusal curves and details can then be corrected, thus securing as completely balanced an articulation as possible.

This method has led to the introduction of so-called "bite adjustment," so that we no longer need, so to speak, grope our way. In this connection it suffices to point out that in bite-adjustment we possess, so far as we know at present, the sole effective *prophylactic* weapon against periodontal disease—provided it is carried out at a sufficiently early stage, very often even before any clinically detectable symptoms have occurred. Such planning, based upon study models, of treatment intended for the human mouth—whether it be merely for bite adjustment by grinding, or preparatory to major reconstruction of a bite—has been called "bite analysis" in a more limited sense.

But to return to what happens in the articulator when surveying a case, I have already pointed out that it is possible to detect a major or minor displacement in the condylar mechanism when a cusp impediment directs the lower jaw into habitual (false) centric occlusion. Such a displacement must of course also occur in the temporomandibular joint. How can this be diagnosed?

Around 1930 this question began to attract increasing attention and resulted in the various X-ray techniques that so far have been evolved. If we could study radiologically the opening movement, observe how long it remains a pure rotatory movement, establish the point at which the condyle begins to move forward and downward along the oblique plane of the articular eminence, and finally determine its ultimate position after maximal opening, then a great step forward would have been taken. This is what has actually occurred, for to-day we are able to verify radiologically what has previously been mere empirical supposition. With these X-ray checks of the temporomandibular joint we have completed our array of diagnostic weapons. But what is more, we possess a very valuable differential diagnostic method of establishing in advance whether we are confronted with a genuine *deep bite* or merely with a *lowered bite* [3]. The X-ray check not only provides information about the shape and type of joint (such as a deep and narrow fossa, or a shallow and wide one, etc.), it also indicates the location of the condyle in the fossa—whether it is in the rest position and symmetrical in both joints, whether it is displaced forward or backward, and whether such a displacement is unilateral or bilateral. Such X-ray diagnosis of the temporomandibular joint—if properly carried out—will afford the best and most reliable evidence of a correct relaxed centric record ; in other words, of the correct rest position of the mandible.

Bite Analysis

After this short review of the principles of balanced articulation, which has been essential to explain some of the most valuable expedients in carrying out the planning procedure called bite analysis, I want in conclusion to give a brief description of the practical procedure in such an operation.

A bite analysis should precede, and serve as basis for, not only prosthetic treatment, but also the surgical treatment of periodontal diseases, and indeed even for the orthodontic correction of a bite. Similarly, the purely conservative treatment of a bite must often be based on preliminary examination and planning of this kind. Finally we have the large group of disturbances in the temporomandibular joints—called temporomandibular arthroses—for which bite analysis is often of primary importance.

To be able to carry out a proper bite analysis one requires :

(1) A comprehensive case history ; (2) a complete radiological examination of *all* teeth ; (3) a careful examination of the oral conditions ; (4) good and accurate study models of the upper and lower jaws ; (5) a survey of the occlusion

and articulation, properly carried out by means of these two models, mounted as above in an individually adjustable articulator and designed to detect any cusp interference that may exist during functional movements of the jaws.

On the basis of these five factors it will then be possible to devise a diagnostic plan for the treatment of the patient in question—a bite analysis in the wider sense of the term.

Case History.—As regards the case history, it suffices to stress the importance of not over-elaborating it in the effort to be as meticulous as possible. Experience has shown that many factors provide but little information for our practical work. Only those factors that serve as positive guidance in our daily work should be annotated, together with those I have already mentioned at the beginning of this paper. Close co-operation with a physician is also necessary ; for experience and intuition tell us that the fundamental cause of the periodontal disease is to be sought somewhere in the internal metabolic processes. Examination of the blood, of metabolism, vitamin levels and possible hormonal deficiency must sometimes be carried out.

Radiological Examination.—It should be self-evident that radiographs must be taken of *all* existing teeth and mounted in such a way as to show clearly not only each individual tooth, but the entire alveolar process—the interdental septa and the periodontal spaces. In this connection we must not only consider those teeth that will subsequently be bridge abutments; it is just as important for us to elucidate the state of the remainder, thus securing a basis for a prognosis for the mouth as a whole, and hence for the treatment planned, in respect to its lasting effects.

Examination of the Oral Conditions.—This should include all conspicuous external factors such as colour and nature of the gums, degree of firmness of the teeth, type of bite, general oral hygiene, formation of calculus, suppuration, and any pockets that may be present, etc.

Survey of Occlusion and Articulation.—The analysis of the articulation of the teeth is carried out on the articulator, as already described ; and a careful note is made as to which teeth require grinding, where and how much, etc., to bring the two arches into as perfect an articulatory equilibrium as possible. In this connection I would draw attention to my earlier work on that subject [4]. And I would like once more earnestly to caution against unduly radical and uncritical application of the laws of articulation, which might result in severe mutilation of sound teeth or overloading of the periodontium of the individual tooth. Here, as in other forms of dental treatment, we very often have to resort to a compromise, guided by our common sense and clinical experience. The value of such preliminary planning of a more complicated and extensive bite reconstruction case must be obvious. For, in starting the practical work in the mouth, for instance the preparation of abutment teeth, we shall know exactly in advance not only how it has to be carried out, but also how much and where each such tooth must be corrected in height, or straightened up, in addition to the grinding for the normal preparation.

Before leaving these technical procedures which bite analysis involves, I want to stress once again the paramount importance of X-ray checks of the temporomandibular joint, if taken and interpreted in connection with articulatory study of the bite. A separate radiograph of the temporomandibular joint will afford little guidance of real value unless implemented by further information on the bite conditions or the articulation. Personally I need a series of at least two, and preferably three, pictures from the same joint ; one in relaxed centric—the so-called rest position—one in habitual centric occlusion and, finally, one in maximal opening position. By comparing these with the series from the opposite joint, it is possible to ascertain:

(1) Whether there is a displacement in one or both joints when closing from rest position into habitual centric position—due to cusp trauma or closing of the bite caused by loss of teeth in the molar region.

(2) Whether the condyle moves to a normal extent, either in one or in both joints, in opening the jaws maximally. This is especially valuable in diagnosing certain forms of arthrosis.

(3) From the shape of the fossa and the condyle and from what takes place in the joint when opening the mouth from habitual centric occlusion into rest position, we are able to diagnose whether we are dealing with a genuine deep bite case or a lowered bite case—as has been described in previous papers [1, 2 and 3].

Without overrating the value of radiographs of the temporomandibular joint, I think our experience during the past fifteen years or so has proved their great importance in connection with the expedients, mentioned above, for the successful planning of the treatment of an individual case ; that is to say, for the bite analysis, which saves us, as practitioners of modern dentistry, from uncertainty and lack of planning in our daily routine.

Finally, I would like to describe some treated cases, which I hope will enable me to demonstrate clearly the practical application of the theories and ideas just expounded.

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PART II

THE three cases that will be described here have been selected from my clinical case material because they illustrate, in virtue both of the degree of malocclusion and the treatment necessitated thereby, the fundamental importance of bite analysis for the planning and accomplishment of reconstructive treatment of a bite.

Common to all three cases were the following factors: an excessive degree of malocclusion, so that both diagnosis and therapy presented major difficulties for the responsible dental surgeon. The first two were genuine cases of deep bite and were thus, in themselves, by no means so rare as might perhaps be thought; but since, moreover, the malocclusion had been accentuated by the loss of teeth and by incorrect treatment, the overbite was so excessive as to be unquestionably unusual. The third case, too, was quite unique in its kind, presenting a type of anomaly which I at least have never previously encountered.

All three cases demonstrate beyond dispute the indispensability of preliminary *bite analysis* in the diagnosis of malocclusion and, above all, in the planning of the reconstructive treatment. In my opinion, no more weighty argument for this contention is needed than a study of the following models (*see* e.g. figs. 18 and 20).

In each case X-ray control examinations of the temporomandibular joint, although of primary importance in determining the modification of the bite, were essential first and foremost for the purpose of establishing whether or not the relatively substantial, and unusual, opening of the bite that had to be effected would result in any sagittal displacement of the mandible. In this connection the radiographic method proved infinitely superior to older ones.

Finally, diagnostic study of the temporomandibular joint in these three cases demonstrated in a most striking way the correctness of those theories concerning the "*rest position*" and "*free-way space*" which, though by no means new, have been discussed so much in recent years, primarily through the admirable works of Thompson.

Thompson determined the free-way space as the difference between the rest position and centric occlusion, measured on cephalometric radiographs as the distance between the two points nasion and glabella.

In my investigations the vertical dimensions were measured on the incisal pin in a Hanau articulator, in which study models of the relevant dentitions had been mounted.

The rest position has long been known as the physiological or relaxed position of the mandible, in which a certain interval between the two arches (free-way space) should always occur. Even though we should perhaps regard a trifle sceptically the rationale that led Thompson to his explanation of this well-known clinical fact, we nevertheless have much to thank him for.

Moreover, both the control examinations of the temporomandibular joint and the profile radiographs in each of the present cases corroborate Thompson's view that this interval between the arches (free-way space) should amount to about 3 mm.

My control examinations of the temporomandibular joint in genuine cases of deep bite have served increasingly to convince me that the free-way space in such cases is invariably *greater* than 3 mm.—a circumstance that has also been pointed out by Thompson. The distance varies according to the degree of deep bite and in extreme cases, e.g. the present Cases 1 and 2, may amount to 9 or 12 mm. If the deep bite is not genuine but sunk, it is fairly evident that the free-way space will exceed 3 mm.

In my opinion, therefore, it would be appropriate to introduce a further distinction in the conception of free-way space; we should envisage not only a *physiological* free-way space, meaning the distance measured between the arches with the mandible in the rest position, but also a *functional* free-way space, by which term I mean the interval that should be left between the reconstructed arches after the raising of the bite which has been considered necessary to establish a balanced articulation. In the present two cases of deep bite (Cases 1 and 2), subsequent check measurements showed that the free-way space, which I propose should be termed the functional free-way space, amounted to about 3 mm.

There is justification for making good the difference (between the physiological and functional free-way space) by raising the occlusal surfaces of the teeth, provided it does not entail an excessive strain on the periodontium, in which case a compromise must be found.

The present three cases had yet another feature in common; namely, they could all be placed in the periodontal disease-resistant category (*see* radiographic findings, figs. 7, 13 and 22), which is further evidenced by the manner in which they reacted both to the incorrect and the correct treatment, as well as

their toleration for many years of the strain of traumatic articulation. Finally, the purely æsthetic improvement was conspicuous in each case, as will be abundantly evident from the photographs reproduced here. The first two cases showed a few characteristics in common that warrant further mention.

In the first place they both presented a severe form of *genuine deep bite*. The maxillary incisors inclined lingually and extended down over the mandibular incisors, occluding at a point below the cervical gingival margin (*see* figs. 2, 3, 4, 9 and 10). Moreover, they both showed the step-shaped compensating curve in the mandible, with the step immediately behind the canines, to which I have earlier called

Before After

FIG. 1 (*Case* 1).—Profile radiographs before and after treatment.

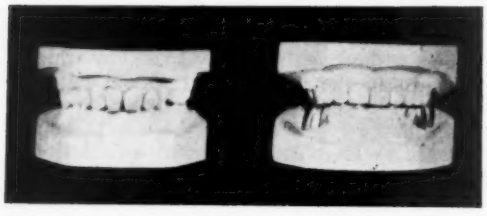


FIG. 2 (*Case* 1).—Articulated models before and after treatment.

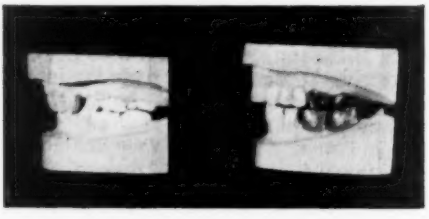


FIG. 3 (*Case* 1).—Left side of mouth before and after treatment.

FIG. 4 (*Case* 1).—Models of mandible showing posterior bridges in place.

Left Right

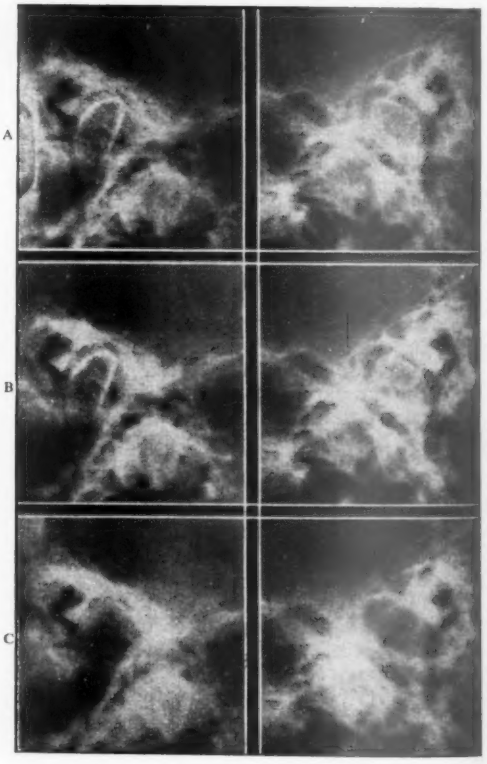


FIG. 5 (*Case* 1).—Radiographs of temporomandibular joints, A condyles in normal position at maximal occlusion in deep bite position ; B temporomandibular joints with splints in position ; C commencement of forward and downward movement of condyles with wider opening of mouth.

attention and which is so typical of the genuine deep bite.

In both cases fixed bridges had previously been fitted behind the mandibular canines for the purpose not only of raising the bite but also of *displacing* the mandible so far forward as to bring the mandibular incisors into contact with the maxillary incisors.

Finally, the two cases presented analogous changes in that the mandible had worked its way back into its original position, this having been made possible by intrusion of the molar and premolar regions, demonstrable at least in the lower jaw. The aforementioned bridges were still present when the patients were referred to me.

And now, having outlined a few general considerations common to the three cases, I will proceed to describe them separately.

Case Histories

Case 1 (figs. 1–7).—Female, aged 28. The patient presented all the signs of an excessive *genuine deep bite* (*see* profile radiograph, fig. 1, and the models, figs. 2–4).

The patient complained of " tiredness " in the region of the temporomandibular joint, especially in the mornings. There were no pronounced symptoms in the joints. The gingivæ were surprisingly sound, even in the incisor region of the mandible. There had been a high incidence of caries, so that virtually all the teeth had extensive fillings. Both the maxillary and mandibular incisors were discoloured, and the former at least were quite undermined by silicate fillings. The patient consulted me with the intention of having jacket crowns fitted to the latter teeth (*see* radiographic findings fig. 7). All the teeth were quite firm.

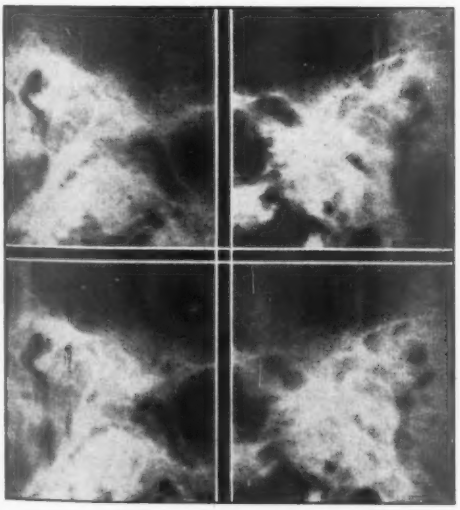


Fig. 6 (*Case* 1).—Temporomandibular joints, A one month and B three months after treatment.

In the lower jaw, symmetrical bridges had been fixed in the molar-premolar region some years earlier with the object of raising the bite and forcing the mandible forward into the edge-to-edge position. However, both of the bridges had sunk, thus giving rise to the present deep bite (*see* figs. 3 and 4).

Study models were prepared and mounted in a Hanau articulator, being orientated in relation to the Camper plane. The condylar indication on both sides amounted to 30°/16°.[1] This—i.e. a relatively acute angulation of the condylar path—was of course consistent with the type of bite ; and since, moreover, radiographs of the temporomandibular joint provided further evidence, showing both condyles to be in a fully normal position at maximal occlusion in the deep bite position, the diagnosis of *genuine deep bite* was established (*see* fig. 5A). According to long clinical experience of such cases of deep bite, raising of the bite, which in this case was indicated by æsthetic and functional considerations, will not necessarily be followed by any appreciable or measurable sagittal displacement of the mandible. We see here, moreover, the reason why the previous treatment failed. The rest position of the mandible was determined, and a metal splint made which kept the jaw in that position. Radiographs were then taken of the temporomandibular joint with this splint in position (*see* fig. 5B), showing distinctly how the condyle still remained in position and rotated round the intercondylar axis. When measured on the incisal pin in the articulator, this increase of the vertical dimension of the bite was found to be as much as 9 mm. Only when the mouth was opened wider did the normal opening mechanism commence to operate, with a forward and downward movement of the condyle (*see* fig. 5C).

From the purely theoretical standpoint we ought now to deduct from this 9 mm. approximately 3 mm. representing the free-way space according to Thompson, so that the finished occlusion curves will represent the actual increase in height of the bite, or 6 mm.

By careful bite analysis on the study models and independently of the above-mentioned theoretical considerations, I then determined, tooth by tooth, the heights of the crowns, thus creating the occlusal curves to establish a balanced articulation ; after which the work of reconstruction was completed. On control measurement of the reconstructed bite

[1] The first figure denotes the horizontal condylar indication (purely protrusive movement) ; the second figure the lateral condylar indication (also called Bennett movement).

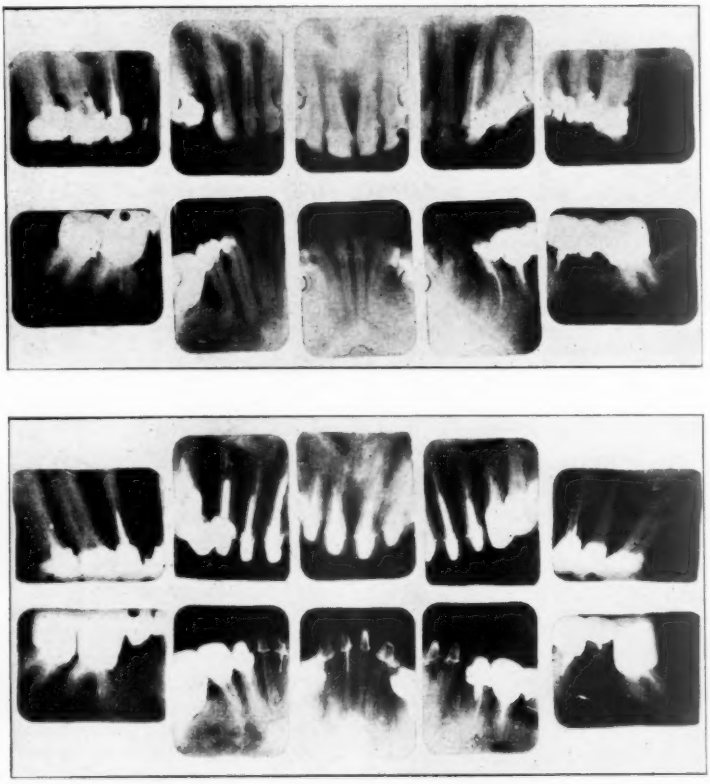


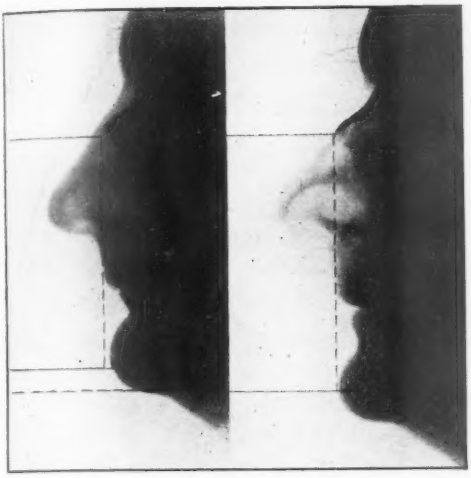
FIG. 7 (*Case* 1).—Radiographs of the teeth. Above, before treatment. Below, three years after treatment.

in the articulator, the increase in height—measured on the incisal pin—was found to be the calculated 6 mm.

From the purely constructive point of view, the difficulties associated with this case consisted in changing the curves of the mandible without lengthening unduly the crowns of the teeth in the molar regions, and in modifying as far as possible the horizontal overbite. Since all the incisors in both jaws were fitted with jacket crowns (for reasons referred to above) a good æsthetic effect was achieved in spite of this relatively unfavourable circumstance. The boldness of this treatment was justified, however, by the good condition of the periodontium, by the patient's age and by the lack of familial predisposition to periodontal disease. During the course of treatment the bite was raised by 6 mm. in one stage, and from the very outset the patient described this new position of the jaw as restful and " natural." The radiographic status of the teeth three years later is shown in fig. 7. X-ray checks of the temporomandibular joints were also made. Fig. 6A shows the results one month, and fig. 6B three years, after treatment.

The four fixed bridges that were fitted in the respective sides of the jaw comprised all teeth including the canines, whereas the four incisors in the maxilla and mandible respectively were individual jacket crowns.

Case 2 (figs. 8–15).—Male, aged 57. This patient, in common with the preceding case, presented all the characteristics of a *genuine deep bite* (*see* profile radiograph, fig. 8, and the models, figs. 9–12). He too complained of " tiredness," as well as tenderness of the masseter muscles on awakening in the mornings. By day he was in the habit of clenching his teeth firmly (this symptom being typical of deep bite cases in general). Otherwise there were no symptoms directly referable to the temporomandibular joints. The periodontium was in surprisingly good condition (*see* fig. 13). The apical changes in each of the mandibular canines were purely local and originated



Before After

FIG. 8 (*Case* 2).—Profile radiographs before and after treatment.

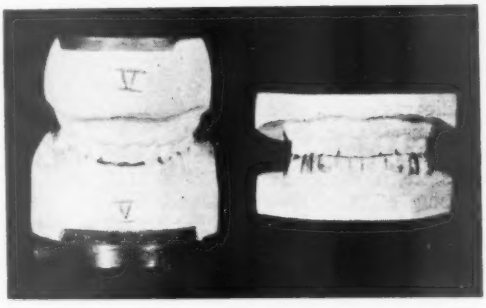


FIG. 9 (*Case* 2).—Articulated models before and after treatment.

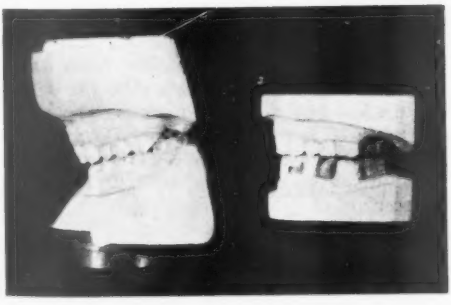


FIG. 10 (*Case* 2).—Showing modification of compensation curves.

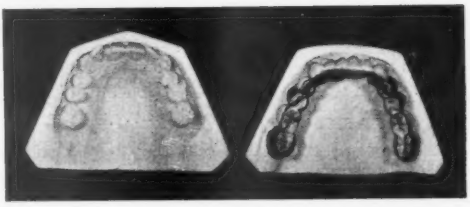


FIG. 11 (*Case* 2).—The finished restoration.

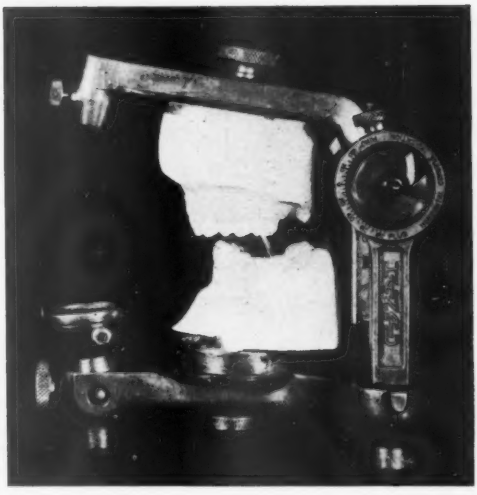


FIG. 12 (*Case* 2).—Showing æsthetically unfavourable protrusion of maxillary incisors.

from the root canals. In contrast to the preceding case this patient showed virtually no disposition for caries, and all the teeth were exceptionally firm. He consulted me because the deep bite was distressing him ; because of the aforementioned tiredness in the muscles of the jaw ; and because the fixed bridges in the molar regions of the mandible, which had been fitted only one year previously and united with the earlier bridge between the mandibular canines, had broken on both sides immediately behind those teeth (*see* figs. 9 and 10).

Study models were prepared and placed in the Hanau articulator. The condylar indication on both sides amounted to 30°/16°. Cf. the radiograph of the temporomandibular joint (fig. 14A) which shows both condyles in a fully normal position in their fossæ at maximal occlusion in the deep bite position. At all events there is no distal displacement whatsoever of the condyles, as in the preceding case.

Hence the diagnosis of genuine deep bite was

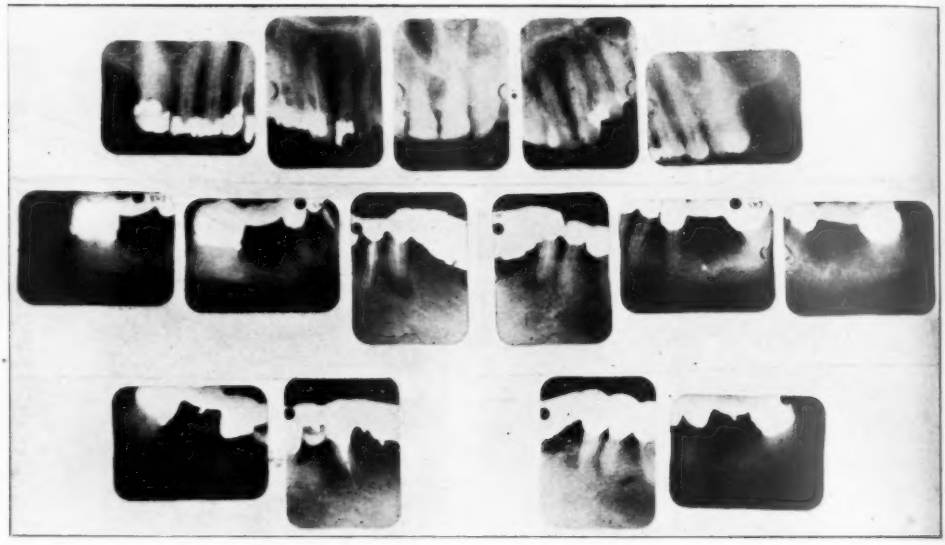


FIG. 13 (*Case* 2).—Radiographs of teeth before and (below) two years after treatment as a result of raising the bite.

established in this case too—possibly even more pronounced following fracture of the bridges behind the mandibular canines. The rest position of the mandible was determined, and metal splints made which kept the jaw in that position. X-ray checks were taken with these splints in position (*see* fig. 14B), and showed the condyles, as expected, to be fully symmetrical and, so far as could be measured, still in the same position ; that is to say, they remained in position and rotated round their intercondylar axis.

When measured on the incisal pin in the articulator, the increase in vertical dimension was found to be as much as 12 mm.—truly a remarkably high figure. Only after further opening of the mouth were the condyles found to show normal movement. On the same theory as that adduced in Case 1, the bite opening fixed in this way (12 mm.), and representing the rest position, had to be reduced by about 3 mm. to obtain the *functional* free-way space ; so that the actual increase in height of the bite, measured on the incisal pin in the articulator, would be 9 mm. in the completed case. Careful bite analysis of the models showed that well-balanced articulation could be achieved solely by modification of the mandibular compensation curves and a relatively mild grinding of the cusps of the maxillary teeth necessitated thereby. Fig. 10 shows how this modification of the compensation curves was effected, and in fig. 11 will be seen the finished result. The lateral bridges were prepared first and fitted temporarily, after which the root canals of the canines were treated and the anterior bridge made and soldered to the lateral sections. The radiographic status and X-ray checks of the temporomandibular joints after treatment are reproduced in fig. 13 and figs. 15A and 15B.

Since, in deep bite of this type, any substantial raising of the bite will result in an æsthetically unfavourable protrusion of the maxillary incisors (*see* fig. 12), many dental surgeons have sought to mitigate this drawback by sagittal adjustment of the mandible. That this cannot be satisfactorily accomplished has been emphasised on several occasions by myself, and in the present case can be demonstrated beyond dispute. By means of the adjusting mechanism, designed by myself, on the articulator, the mandible was displaced forward just far enough to bring the mandibular incisors into their correct position relative to the maxillary antagonists, after which splints were made which kept the jaw in that position. X-ray checks were then taken of the mandibular joints (*see* fig. 14C), and constitute such weighty evidence that no further discussion of the impossibility of forward displacement of the mandible in genuine deep bite with typical joints should be necessary.

In this case the patient adapted himself well to the new position of the jaw immediately after the splints had been fitted ; the tiredness disappeared, and with it the muscular tenderness and the habit, or rather bad habit, of continually clenching the

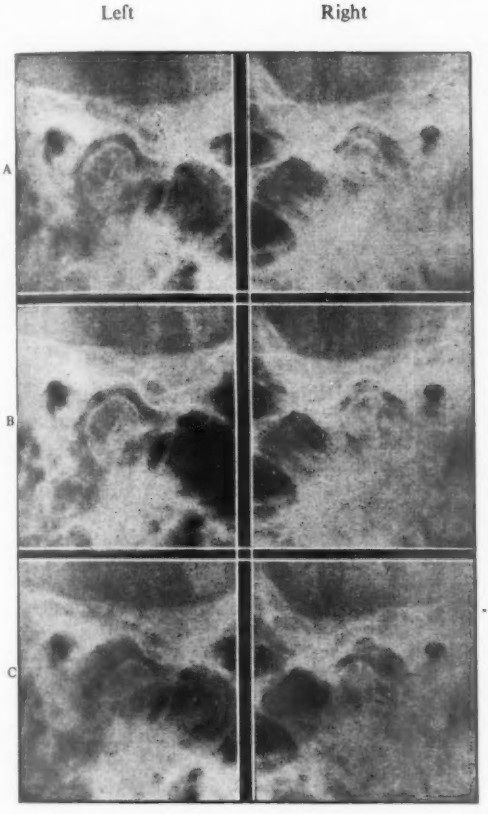


FIG. 14 (*Case* 2).—Radiographs of temporomandibular joints, A before treatment, condyles in fully normal position; B position of condyles with splints in position; C position of condyles after displacement forward of mandible.

teeth firmly. Moreover, the purely æsthetic effect was highly satisfactory (*see* fig. 8, right).

On completion of the reconstructive measures the actual raising of the bite, measured on the incisal pin, amounted to the 9 mm. that had been envisaged.

Fig. 15A shows the radiographic control one month after completion, and fig. 15B a further two years after completion.

Case 3 (figs. 16–25).—Female, aged 27. This patient sought treatment for an exceedingly defective and maldeveloped bite, which had also caused conspicuous exterior changes (*see* figs. 16 and 17). The mouth was sunken, the corners of the mouth drooped—the left most markedly—and the entire left side of the face appeared sunken and askew. The bite was truly appalling (*see* figs. 18–21),

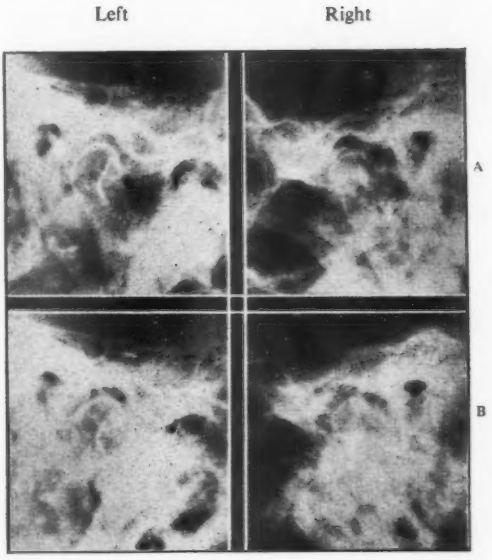
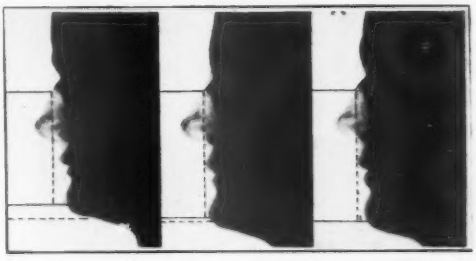


FIG. 15 (*Case* 2).—Radiographs of temporomandibular joints, A one month and B two years after treatment.



Before After Rest position

FIG. 16 (*Case* 3).—Profile radiographs before and after treatment.

FIG. 17 (*Case* 3).—The patient.

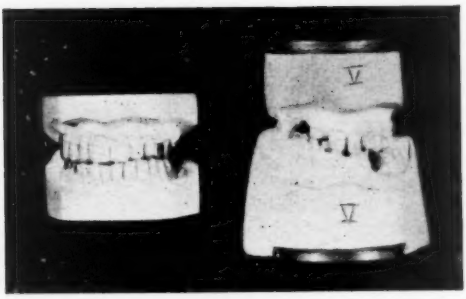


FIG. 18 (*Case* 3).—Right, before treatment ; left, after treatment.

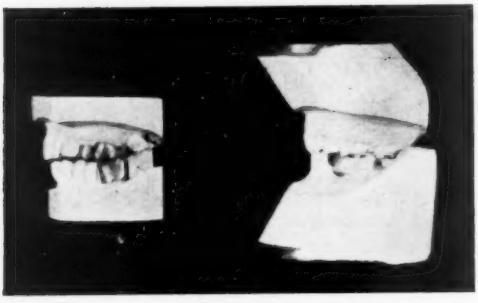


FIG. 19 (*Case* 3).—Right, before treatment ; left, after treatment.

FIG. 20 (*Case* 3).—Articulated models showing obliquity of entire occlusal plane.

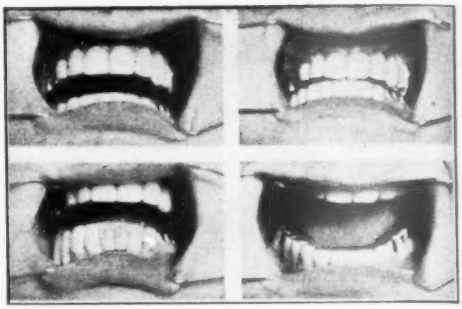


FIG. 21 (*Case* 3).—The restorations in position.

the remarkable thing being that the existing gaps were due to the fact that the relevant permanent teeth had never been formed. Persisting deciduous teeth and the presence of cone-shaped teeth did not improve the situation, in addition to which the entire occlusal plane was oblique (*see* figs. 18 and 20, and radiographic findings, fig. 22).

A more detailed account of the condition of the teeth may be of interest.

Maxilla: $\overline{76}|$ normal position; $\overline{54}|$ rotated about 90 degrees; permanent $\overline{32}|$ missing; in this gap the deciduous $\overline{c}|$ persisted. $\overline{1}|$ and $|\overline{1}$ were normal but markedly abraded below the level where rachitic hypoplasia had been present. The permanent $|\overline{23}$ were missing, and in their place the deciduous $|\overline{c}$ persisted without its crown. This latter tooth had a root canal filling and was fitted with an amalgam surface. $|\overline{45}$ were missing. $|\overline{6}$ was solitary and approximately in its normal position. It had a root canal filling dating back to childhood.

Mandible: $\overline{6}|$ was the only remaining tooth on that side and was approximately in its normal position. $\overline{543}|$ were missing. $\overline{21}|$ and $|\overline{123}$, all typical cone-shaped teeth, were spread fanwise ; $|\overline{45}$, normal premolars, were in their normal position; the masticatory surface of $|\overline{6}$ was substantially lower, and that of $|\overline{7}$ substantially higher than the others.

The plane of occlusion was markedly oblique (*see* fig. 20). Radiographs taken when the patient was 13 years old showed that none of the teeth that were now missing had ever been present.

The patient had a long-standing history of suffering, in addition to all the children's diseases; she had had rickets, repeated attacks of pneumonia before the age of 8, severe enteritis and constant affections of the nose and ears. In 1936, at the age of 13, she developed a mild and insidious form of poliomyelitis, that was not diagnosed with certainty until many years later, when in 1942 she sought

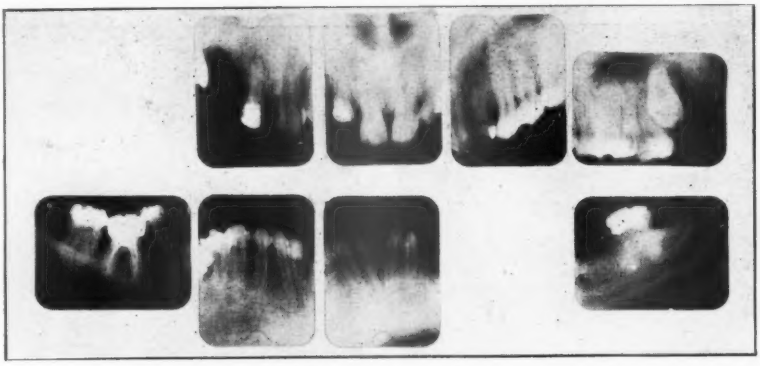


FIG. 22 (*Case* 3).—Radiographs of teeth before treatment.

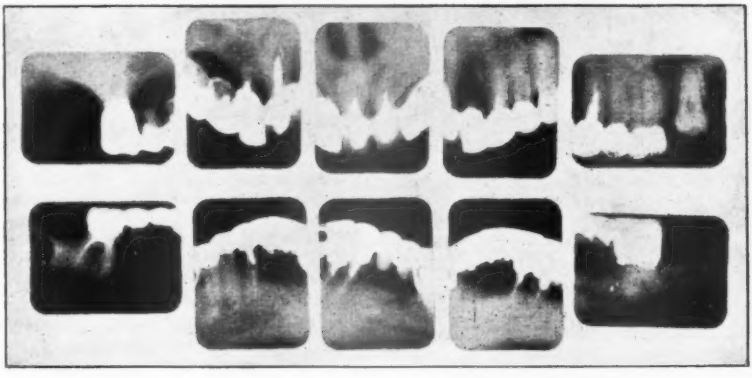


FIG. 23 (*Case* 3).—Radiographs of teeth one year after treatment.

treatment at the Cripples' Institution on account of paresis of the left foot resulting in a bad gait. The entire left side of the body had been weak and somewhat under-developed in relation to the other side. There was mild paresis in the left side of the face, with asymmetrical control of the corners of the mouth, when the patient came under my care. The extreme anomaly of the bite was probably attributable to this long history of illness, although the exceptionally oblique displacement of the plane of occlusion was problematical. No symptoms whatsoever were present in the joints, and radiographs of the temporomandibular joints (*see* fig. 24A) showed both condyles to be lying fully symmetrically in their respective fossæ.

Study models were prepared and mounted in a Hanau articulator. Condylar indications : right side 25°/15° ; left side 30°/16°. The rest position of the mandible was determined and metal splints prepared ; and this position, as measured in the articulator, was found to correspond to an increased height of 7 mm. on the incisal pin (*see* fig. 24B, in which the condyles are in the right positions in their fossæ). An attempt to classify the type of bite in this case would doubtless involve some difficulty owing to the extreme malformation of the arches. Apart from this factor, however, the bite was probably classifiable as a relatively mild type of genuine deep bite—this being indicated both by radiographs of the temporomandibular joints and by registration of the condylar inclination. The main problem lay in deciding, when analysing the bite, to what extent one might venture to raise and lengthen those crowns that were situated a good deal below the horizontal plane—yet avoid undue damage of the periodontium—while at the same time those crowns which were considerably higher than the horizontal plane had to be reduced without jeopardising the vitality of their pulps.

The following teeth were extracted: $\underline{7}|$ and the

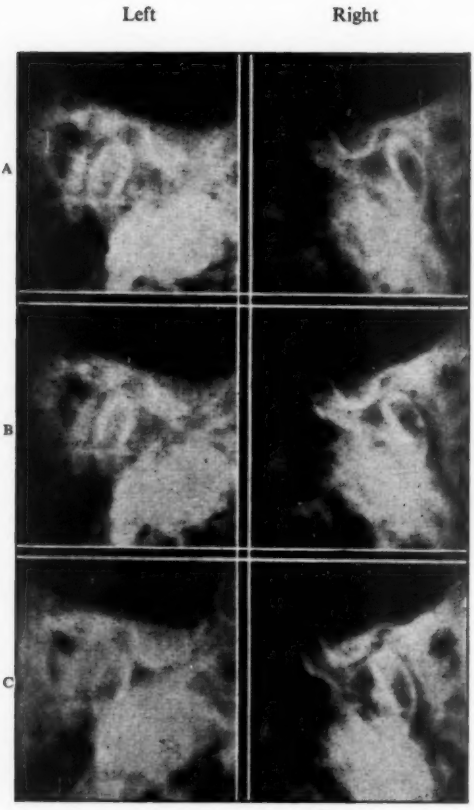


FIG. 24 (*Case* 3).—Radiographs of temporomandibular joints, A before treatment, condyles lying symmetrically in their fossæ ; B position of condyles after raising bite by 7 mm.; C left condyle forced forward by premature occlusion of left molars.

deciduous c | in the maxilla, and | 127 in the mandible. The following were treated with root canal fillings : | 1 and 1 | owing to the poor condition of the crowns, which precluded any effective and at the same time æsthetic anchorage; and for the same reason 321 |. The other abutment teeth were retained in their existing vital condition; namely, 654 |, 6 | and | 456 (| 6 and | 3 already had root canal fillings, *see* radiograph, fig. 22). The deciduous | c was fitted with a Richmond crown, not with the intention of securing any essential support for the bridge (span from | 1 to | 6), but rather to serve as a root tip and to obviate any further descent of the arch by resorption.

The results are shown in figs. 18, 19 and 21.

The case may well be regarded as successful both

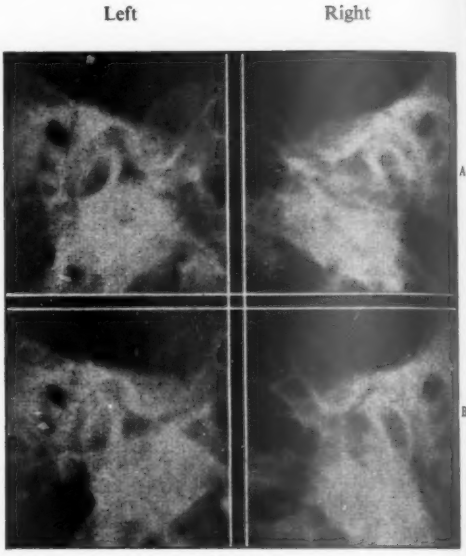


FIG. 25 (*Case* 3).—Radiographs of temporomandibular joints, A left condyle in correct position after correction of occlusion ; B position of condyles one year after completion of treatment.

from the functional and from the æsthetic standpoints. The patient immediately accustomed herself to the new position of the jaw, and even from the purely psychological standpoint the treatment yielded results that by far transcended her own expectations. The definite increase in vertical dimension of the bite (measured on the incisal pin) amounted to 5 mm.

The treatment of the mandible was completed in the spring of 1948, and that of the maxilla in the autumn of the same year. When all the bridges had been fixed the patient noticed a very slight cusp trauma on clenching the teeth. The molars of the left side occluded slightly before those of the right, after which the mandible moved one-fourth the width of a tooth into the central position. Radiographs of the temporomandibular joints in this position (fig. 24C) showed distinctly how the left condyle had been forced slightly more forward in the fossa than the right condyle. The impediment was located with carbon paper, and proved to be the ridge on the distobuccal tubercle of | 6. When this had been removed, the mandible went directly into the centric occlusal position. Further X-ray checks were then taken of the temporomandibular joints (fig. 25A) and showed the left condyle to have returned to its correct position—fully identical with 24A (at the outset), 24B (after raising) and 25B (one year afterwards).

This series of radiographs of the temporomandibular joints should demonstrate conclusively, partly the importance of this check method in determining the correct centric occlusal position and as a guide as to how far a bite can be raised, and partly the sensitiveness with which it registers even very slight impediments between the arches.

In conclusion, it is my hope that these three clinical cases from my collection will have sufficed to demonstrate in a practical manner the value of those considerations and methods described in greater detail in the earlier part of the paper.

Discussion

Dr. Naval Dordi (All-India Dental Association) referred to a case with which he had had to deal. The patient was a hunchback, bowed down on one side and with the other shoulder in the air. When taking the impression for the bite he found that the ridges were much nearer to each other on the side on which his body was depressed, than they were on the side on which his shoulder was high in the air. A denture was eventually made for the patient and he went away. After ten years he came back for a spare denture, on the ground that the one which he was wearing was by now very old, and on taking an impression it appeared that the bite had become completely normal, which seemed an astonishing thing to happen. He did not know what the explanation of that would be and would be grateful for Dr. Lindblom's opinion.

Dr. Lindblom said that he could not give an explanation, because the cause might have something to do with the whole development of the oblique condition in question. He himself had had a case—the third one mentioned in his paper—in which the bite had not changed back to normal, but, due to some queer cause, the whole occlusal plane was oblique.

The only thing that he would do in such a case would be to find out what seemed to be the proper vertical dimension and to take a radiograph of the joint, and, if he found that the condyles were symmetrically located in their fossæ, he would not worry about the oblique condition, but would accept it as typical and not try to change it, because it was possible to create a balanced articulation even in a queer case of that kind, if there was correspondence between the condyles in the fossæ and the arrangement of the teeth, but one would not expect such a denture to develop symmetrically compensating curves.

Mr. H. H. Boyle observed that they were getting to a conception of the maxillo-mandibular occlusion as a functional entity. He thought that more emphasis than was necessary, and than the author perhaps intended, had been given to the relative importance of the temporomandibular joint. Personally he had committed himself to the statement which he had backed by scientific thinking, that the mandibular condyle in its shape in the mandible followed the articulation of the teeth. It was modified when the articulation of the teeth was modified and made asymmetrical if the articulation of the teeth was asymmetrical. It could be corrected to a great extent if the symmetry of the teeth in occlusion and articulation were made correct. It had been a great delight to listen to Dr. Lindblom and one could not fail to be impressed by his deep sincerity.

Dr. Lindblom agreed that in presenting what he had to say that morning in a necessarily condensed form he might have emphasised too much the importance of the condyle, which was not, of course, the primary guiding device. The only circumstances in which a perfect functional bite was obtained were when the guiding influence by the occlusal surfaces on the condyles corresponded very closely.

Mr. Boyle had raised a very interesting question on which a definite answer would be most welcome. The only people who would be able to give that answer were, he thought, the orthodontists. The question was to ascertain which was the primary factor. Was it the formation of the condyle on the fossa which, so to speak, arranged the teeth as they were actually developing and created different kinds of occlusion, or was it an inherited factor which gave rise to a deep bite condition in youth, when the bone material was very elastic, and was it the articulation of the teeth that were conditioning the joint to take a certain form? He thought that the solution of the whole question might be found there. He had never dealt with temporomandibular joints in children. All that he knew, and thought that he had been able to prove, was that the temporomandibular joint was not as adaptable in the adult as had been imagined, and that explained why, when one abused the joint conditions in reconstruction, one sometimes had great failures.

In studying the temporomandibular joint in different types of bite, he had been able to show that the joint must be of a different type in different types of bite. With a normal bite there was a very moderate compensating curve and not too deep overbite, and there was a comparatively shallow fossa. With an end-to-end bite the patient was capable of moving the lower jaw in almost all directions without any cusp interference. There was a blunt head of the condyle and a shallow fossa. With a genuine deep bite in the open position the condyle head was smoothed down, leaving the fossa empty. Such a joint must function more or less as a hinged joint, and in those closed-bite conditions the patient could only move the jaws up and down, and could not do any lateral movements, partly due to the cusp locking in this deep bite condition, but also due to the typical shape of the fossa.

Mr. W. Peebles said that recently he had seen a series of four or five cases which he had endeavoured to treat symptomatically. They had all shown almost exactly the same syndrome. They were for the most part the cases of middle-aged women whose teeth showed considerable attrition, and they complained of certain definite symptoms. They complained of pain in the temporomandibular joint on waking up in the morning, and that they were clenching their teeth, and very often their husbands complained that they ground their teeth at night, sometimes waking them up by making so much noise in the process. It was obvious that those patients had to be treated, and by purely hit-and-miss methods he realised that the cause of the trouble was a closing bite. He had given them great relief simply by putting in a bite plate, to be worn at night, made of clear acrylic resin. That had relieved their symptoms. In other cases,

where the erosion was more considerable, he had made metal dentures completely covering all the occlusal surface of the teeth, which had had the same effect, and had also given them a better articulation from the purely masticatory point of view.

That, however, was treating the patients on a purely symptomatic basis. In future he would attempt to make Dr. Lindblom's bite analysis and to work more accurately, but it would be interesting to have Dr. Lindblom's comments on the question of the general practitioner treating these matters symptomatically, and whether it was correct to do so on the lines indicated.

Dr. LINDBLOM replied that Mr. Peebles had raised a very interesting point. Those who had read the paper had probably thought that the methods described therein were very extensive and very expensive ways of carrying out dentistry. He must admit that he had been dealing with extreme cases, and that the work which he had been carrying out as a specialist must be impossible to apply to the general mass of the population, but the general mass of the population required help, because the symptoms in question in the temporomandibular joint occurred just as frequently among them as among people in more fortunate circumstances. It was not his intention, of course, to suggest that dental practitioners should immediately buy a certain device which would enable them to take X-ray pictures of the temporomandibular joint and so on, and it would not be necessary for the general practitioner to do so, because as time went on it would be found that specialists would become available for taking such pictures and making an accurate diagnosis, and even making the bite analysis, though the bite analysis was something which it was not impossible for the general practitioner to carry out. More complicated cases, however, would probably be referred to a specialist who was carrying out bite analysis along the lines described in the paper, and who would be able to give definite advice on how to carry out the treatment.

He thought that the way that Mr. Peebles had suggested was the correct one, and the one which should be practised, because if one had a good clinical opinion one could immediately, without making an analysis in the articulator, detect whether there was a considerable difference between the rest position and the closed tight bite. If one saw the lower jaw coming up against the upper, one would notice that something happened which carried the lower jaw into a false position, and by interposing soft wax one could stop the mandible just at that position. That was an easy way of dealing with it, and then, of course, one had to put in something temporary. If a fixed bridge could be made it was the ideal method, or resort might have to be had to some kind of splint.

These light splints were very valuable for people who ground their teeth, because they saved the periodontium a great deal. He had in mind those extreme cases which could not be protected by grinding. If one could detect cusp interferences, and by grinding them away create good lateral balance, that was a good thing, because it was the horizontal component which was the most destructive for the teeth. Even in such a case something might be done by the use of fixed bridges, thus creating freedom and giving the periodontal membrane a chance to relax.

Mr. J. W. GILBERT thought that they were getting somewhere from the point of view of the general practitioner. Dr. Lindblom had put his finger on a point of very great importance. If patients were in this condition of what he would call mal-ease for twenty-four hours a day there was trouble, but if they could be given eight hours relief so far as their temporomandibular joint and dental tissues were concerned, the tissues would tolerate sixteen hours of ill-treatment. The discussion was getting on to lines which the ordinary practitioner could adopt. If it were possible to provide something simple, perhaps along the lines of a plate between the teeth at night, one would have solved the immediate problems of such patients.

Mr. G. B. HUNTER asked whether the creation of an overjet by opening the bite was a contra-indication to treatment. He had had a case, he said, of a girl of 22 who had a face like a fox and was obviously a tooth-grinder. He thought of opening the bite, but it would result in at least 5 mm. of overjet between her two arches and the patient might then feel that the upper teeth stuck out. Was that a contra-indication, or should he proceed?

Dr. LINDBLOM agreed that there was a limitation there. They were both talking, he said, about the rather extreme overbite cases with a pronounced vertical overbite. If one opened it, one would get a condition which was not really favourable at all; that was why one pushed the lower jaw forward, creating a much better result æsthetically, and very often a better cuspal relation between the lower and upper teeth. Experience had taught him that such a sagittal displacement of the mandible was not possible without moving the condyle in the fossa correspondingly forward. With a typical deep bite it would not be possible to make such a forward movement, and the result would be a tendency for the condyle to go back, which would create cuspal interference in the reconstructed condition.

It was therefore necessary to resort to a compromise, and to accept a lower degree of bite opening than one would wish to do. On the other hand, if deep bite condition was the result of the loss of molars and premolars, that meant that the lower jaw had been forced backward and upward against the oblique plane of the incisors.

It was interesting to find that these genuine deep bite cases were for the most part resistant to periodontal disease. On the other hand, if one happened to have a normal case one would have a distal displacement of the condyle. Formerly one spoke about the dentist pushing or adjusting the lower jaw forward in opening the bite, but in his view what the dentist should attempt to do was to create the proper opening of the bite and let the mandible adjust itself forward just as much as the joint permitted, and not more.

Mr. S. P. MEACOCK asked whether Dr. Lindblom was aware that there was a skull in the Royal College of Surgeons with the upper centrals locked by the laterals, and in which the eminentia articularis lay backwards apparently parallel to the centrals. This might be a partial answer to Dr. Lindblom's question of whether the joint determined the teeth or the teeth determined the joint. There was an article on that by Dewey in *Dental Cosmos* in 1911, which was quite interesting. The other point in favour of the latter view was Professor

Humphreys's observations on the date of formation of the eminentia articularis.

Dr. LINDBLOM, replying to a member who asked whether he thought that the muscles of mastication played a part in determining the height of the bite, and whether, if the bite was opened artificially, it might be closed again by the forcing of the teeth down into the jaw by the action of the muscles of mastication, said that the muscles must be given an opportunity to relax. One could clench one's teeth and keep them together, but as soon as one ceased to think about it the lower jaw would fall down with the relaxation of the muscles. That was why, though agreeing with Thompson in his description of the rest position and the free-way space, he was not sure that he agreed about the suspension of the mandible. Thompson's view was that the mandible was supported partly by the muscles in closing and partly by the muscles in opening, and that the rest position was the equilibrium when the closers and the openers were in a state where they counteracted each other. That would seem to mean that these unfortunate muscles would never have an opportunity to relax, but it was found in the body generally that an organ could not be stressed or be in action all the time without getting a chance to relax. He thought that the rest position of the mandible was when the mandible was just hanging loosely and the muscle tension was relaxed.

That was why he thought it was so dangerous to overdo opening a bite so that one did not create the free-way space and never gave the muscle an opportunity to relax.

Miss B. H. POOLE asked whether Dr. Lindblom could give any guidance on the percentage which might be filled up of the height between the rest position which he obtained in the bite and the complete closing of the tips of the incisors of the lower jaw against the upper in overbite cases. As Dr. Lindblom said, building too high was going to cause a great deal of trouble, and some guidance was desirable as to how high one might safely build. What percentage of the distance between the rest position of the lower jaw and the closed position when the teeth were in contact could be filled with the apparatus ?

Dr. LINDBLOM replied that it was always difficult, and even dangerous, to express something in fixed figures when dealing with physiological conditions in the human body. When Thompson pointed out that the free-way space should be 3 mm. it was a dangerous statement to make. For the sake of simplicity it was convenient to speak of a full denture. Thompson meant that there should be a free-way space between the upper and lower of 3 mm. in the relaxed position. In other words, in establishing the height of the bite in such an edentulous case one could do it according to æsthetics or according to measurements or in any way one liked. That would be the relaxed position, but if one built one's bridges or one's full denture case up to that height something was certain to happen. In the edentulous case there would be resorption until the free-way space which gave the muscles the opportunity to relax had been re-created.

On the other hand, he thought that that brought out another point in establishing the height of the bite which ought to be emphasised. It brought out the laws of articulation, the correspondence between the heights of the cusps, the overbite horizontally and vertically, the inclination of the condylar path and the compensating curve. Those were the factors which created balanced occlusion. Coming back to the establishment of the proper height of the bite, it must be realised that in, say, a full denture case, if one was not getting very close co-operation between these factors, and using teeth with high cusps, for instance, one was likely to spoil the crest, but one must not go to the other extreme and take away all the cusps, because that was no good either, since some kind of cusp inclination was needed to create balance in the lateral movement. That was why the height of the cusp, the compensating curves and the degree of overbite or overjet must correspond to the inclination of the condylar path. That gave the whole clue to a well-functioning masticatory apparatus, either a full denture case or a natural case. It gave the most even distribution of stresses on the individual teeth, or upon the crests in the full denture case.

There was need for bite analysis because the joint was not a hinged joint and that the teeth were not driven into the mandible as nails were driven into wood but were movable and supported by a very elastic membrane.

If the true position were borne in mind, it would be easy to understand that the vertical overload was not so dangerous, due to the formation of an elastic cushion at the bottom, while the horizontal overload on a tooth was always dangerous. On the other hand, if one looked at a temporomandibular joint one knew that something was going to take place there, and that there could be displacement in all sorts of directions. That was some sort of explanation of all these troubles in the joint.

It was known that if a bite was adjusting itself in the normal way it was producing some kind of wear. Wear was an effort to take away the high, steep cusps which were transmitting the horizontal overload on the periodontium. Then there was an interesting fact—he did not know whether there was here a real explanation of why there was so much periodontal disease—namely that there was a tendency in civilised man for the periodontal membrane not to keep up throughout life the maximum function of the earlier years when there were these high cusps. What should be done ? Following nature, it was necessary to try with increasing age to lower the horizontal component of the pressure. When the matter was regarded in that way it was easy to understand the value of bite analysis.

The PRESIDENT said it would be agreed that Mr. Peebles had put his finger on the spot, and that when great scientific minds in dentistry brought themselves to consider a problem which was of general interest they were able, by their great experience, to distil for the benefit of general practitioners essential knowledge which would help them in their chairside work. *Par excellence* that was what Dr. Lindblom had done that morning.

Mr. A. E. ROWLETT proposed and Mr. Norman Haines seconded a vote of thanks to Dr. Lindblom for his paper. This was carried by acclamation.

EVERYDAY PROCEDURES IN DENTISTRY

A CLOSED MOUTH IMPRESSION TECHNIQUE FOR FULL DENTURE CONSTRUCTION

By ALAN MACK, L.D.S.Eng.

Assistant Director, Prosthetic Department, Royal Dental Hospital of London

Normally, the construction of full dentures necessitates the attendance of the patient on at least five occasions. The technique to be described necessitates four visits only, the bite and final impressions being taken at the same time. In addition :

(1) The impression is taken with the soft tissues in the position they normally occupy during functional occlusion.

(2) The direction and distribution of compression approximates to that exerted during mastication.

(3) The impression is better tolerated than plaster or alginate hydrocolloid, especially in cases where retching is encountered.

(4) The finished dentures show more adhesion than is normally found in those constructed from plaster impressions, although this is not evident until the dentures have been worn for twenty-four hours.

Technique

At the first visit composition impressions are taken in stock trays. The impressions are roughly muscle trimmed by suitable movements of the soft tissues, i.e. protrusion of the tongue and digital manipulation of the cheeks.

Wax bite blocks on shellac base plates are made to fit the resultant models, the following points being borne in mind: (*a*) The base plates should be fairly stout and should not extend too deeply into the sulcus ; (*b*) the wax should be of a toughened variety.

Originally, composition bite blocks were used but later discarded owing to difficulty in trimming. Wax was substituted and with reasonable care was found to be equally suitable.

The bite blocks are next tried in the mouth and the base plate carefully trimmed in order to ensure freedom from interference with soft tissues at the periphery.

The upper block is then trimmed to the correct occlusal plane and the lower block adjusted to the correct height and occlusion with the upper.

Two lateral V-shaped notches are made in the upper bite block in the premolar region. A little wax is placed on the lower block corresponding to the notches in the upper block.

The bite plates are reinserted and the correct centric occlusion registered. They are then removed from the mouth together, thoroughly chilled and separated.

After drying with gauze the base plates are spread with a zinc oxide relining paste over the whole of the fitting surfaces. Provided the composition impressions have been accurately taken, only a thin covering will be necessary. The lower is placed in the mouth, gently seated, and the patient instructed to protrude the tongue in order to trim any excess in the lingual region. The upper is then inserted and the mouth is closed into the correct occlusion as indicated by the markings on the bite blocks. At this stage the patient must be told to remain fairly firmly in occlusion for five minutes and to move the lips to simulate the sounds of " ee " and " oo " to complete the muscle trimming of the periphery.

Provided no excessive pressure is placed on the wax blocks at this stage and no attempt made at protrusion of the mandible, it has been found that no noticeable distortion of the wax will occur.

After five minutes the impressions are removed and washed in cold water to remove saliva and chill the wax.

Laboratory Technique

Models are poured in hard plaster (Kaffir D) their surfaces being allowed to remain rough. When the hard plaster has set the bite blocks are articulated and the whole mounted on an articulator, the rough surface of the models serving as anchorage for the plaster. After trimming of the models, still on the articulator, the blocks are separated and the impressions removed from the models. For this latter operation careful leverage with a wax knife is usually

The completed impressions.

all that is necessary, in most cases the zinc oxide paste leaves the plaster quite cleanly. If necessary the models are cleaned of any remaining paste with a little chloroform.

The case is then ready for setting up and finishing in the usual way.

ACKNOWLEDGMENTS

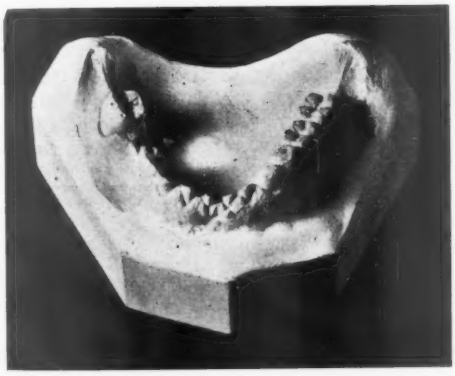
I should like to thank Mr. N. J. Ainsworth, *M.C.*, F.D.S., L.R.C.P., M.R.C.S., Director, Prosthetic Department, for his comments on the technique and the School Authorities of the Royal Dental Hospital for permission to publish the photograph.

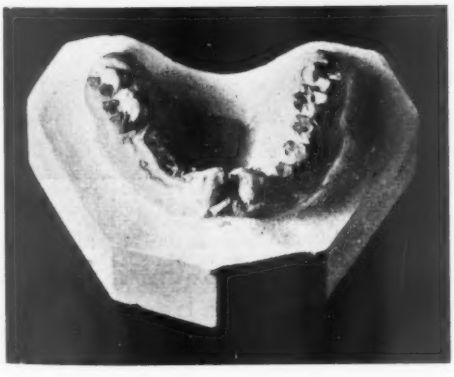
SHORT COMMUNICATIONS

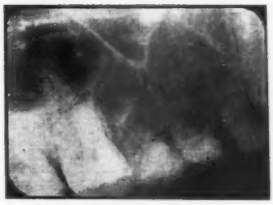
PARTIAL ANODONTIA

BY J. S. SELBY, L.D.S.SHEFF.

MR. J. W., aged 25 years, presented with pain occasioned by a loosened $\overline{a}|$. On examination it was found that the whole of the deciduous dentition was present in the lower jaw with the exception of $\overline{e}|$, the only permanent teeth in the whole jaw being the six-year-old molars.







In the upper jaw the dentition was as follows :

$$\underline{76edc1} \,|\, \underline{1\quad 67}$$

Radiographs were taken and showed no other permanent teeth present.

A CASE OF COSTEN'S SYNDROME

BY S. P. JOHNS, B.D.S.LOND.

THE patient, a man aged 32, presented himself complaining of a burning sensation on both sides of his upper jaw, which he demonstrated to be most marked in the premolar region, and a feeling as of tightness of the skin of his face beneath the level of his eyes, this being more marked on the right-hand side.

On examination he proved to be edentulous with the exception of $\overline{321}\,|\,\overline{123}$, and was wearing full upper and partial lower dentures. These he stated he had had for twelve years. The majority of the missing teeth had been removed when he was 19. The upper denture was still an excellent fit and he had no complaints about either. When questioned as to the condition of his mouth he said that he was continually aware of a bad taste, and that his tongue was slightly sore at the tip. Examination of the remaining incisors showed there to be some tartar formation on the lingual aspect and, due to the vulcanite denture, which was fitted to

the necks of the teeth, having sunk, there was a marked gingivitis and some loss of gum tissue, mostly in the $\overline{3}|3$ region. The corners of the lips showed slight reddening, and the patient stated that in the wintertime they had a tendency to crack and were slow in healing. There was no suggestion of ulceration in the mouth. Further indirect questioning elicited the statement that the patient had intermittent deafness in his right ear.

The dentures were examined in the mouth from the point of view of the vertical dimension of the bite. At first sight this did not appear to be diminished, but a careful examination suggested that a more normal rest position would be an increase of about 5 mm. on the present vertical dimension. It was therefore decided to open the bite by 4 mm.

The lower incisors were scaled and polished, and the patient advised to leave the lower denture out for about four days before the impressions were to be taken, in order to allow some subsidence of the gingival œdema. The impressions were taken in plaster and at the bite stage the vertical dimension was increased by 4 mm. At this stage a slight difficulty was encountered, for with this bite, in order that the upper and lower incisors should make contact in an edge-to-edge position, it would be necessary to bring down the upper incisors far more than æsthetic considerations would allow. A compromise was arrived at however, the upper incisors being dropped back as far as possible with slightly more of the incisal tip visible beneath the lip line than would be normal, and at the same time failing to make edge-to-edge contact in the forward bite position by about 1·5 mm. The lower denture was constructed with a lingual bar, and acrylic spurs to the cingula of $\overline{3}|\overline{3}$. The patient was advised to wear the dentures at night.

When seen again ten days later the patient stated that the symptoms had begun to diminish about five or six days after the fitting of the new dentures. He now had no abnormal sensation inside his mouth and his face felt relaxed, he no longer being continually aware of it, as he had been previously. The tongue was no longer sore, and the bad taste had gone (cf. the lower incisors now being clean, and the new denture being of the design stated, the gingivitis had largely resolved). The corners of the lips were no longer red and the hearing was normal. The patient, who was highly intelligent and gave no indication of being a neurotic type, had co-operated well. He volunteered the information that he could see better, for apparently he had had some difficulty in focusing due to a continual twitch of his lower eyelids. This twitch had now ceased, and vision being normal again, he felt better able to concentrate on his work.

Comment

This case would appear to be of some interest for the following reasons: (1) There were no symptoms related directly to the temporomandibular joint, and no unusual noises could be heard with the aid of a stethoscope. (2) Some of the symptoms that could be referred to the mandibular division of the trigeminal nerve, i.e. the bad taste and sore tongue, could equally well be referred to the tartar and gingivitis present. (3) The maxillary division of the trigeminal nerve afforded definite evidence of being involved, viz. the pain in the maxilla, the sensation of tightness of the skin of the face, and what was presumably secondary to this, the twitching of the lower eyelids.

Summary

A case of Costen's syndrome is described together with treatment and resultant cure. Comments on this particular case are made.

A DENTIGEROUS CYST

By Surgeon Commander (D) L. A. MOULES, R.N., L.D.S.Eng.

This case of dentigerous cyst in a patient aged 22 is of interest in that the position of $|\overline{8}$ is a little unusual. The apices of this tooth were flattened and turned at right angles to accommodate themselves in the thin lower border.

$|\overline{67}$ appeared to be vital but at operation were found to be denuded of bone on their inferior and buccal aspect.

The patient complained of vague discomfort and progressive loss of sensation in the lower lip. Recovery after operation was uneventful and full sensation was restored in about six weeks.

BRITISH DENTAL JOURNAL
AUGUST 18, 1950

REPORT OF THE CENTRAL HEALTH SERVICES COUNCIL

THE first report of the Central Health Services Council, constituted under section 2 of the National Health Service Act, 1946, was issued recently[1]. Covering, as it does, the period from July, 1948 to December, 1949, the report is very largely concerned with the preliminary organisation of the work of the Council and that of the nine Standing Advisory Committees. These latter bodies, including the Standing Dental Advisory Committee, are not committees of the Council, but independent statutory bodies which derive their authority direct from section 2 of the Act. They, may and do, submit advice direct to the Minister of Health without reference to the Central Health Services Council. They are, however, required to send copies of any such reports to the Council who may express their views on them. It is obvious that there will be occasions when the Council may not agree with the views put forward in a report of one of the Standing Advisory Committees. This position has already arisen and the report records that in two cases the Council suggested to the Minister that reports should be referred back by him to Standing Advisory Committees. This position is, however, only likely to arise when a report raises wider issues than those which concern only the service with which the particular Standing Advisory Committee is concerned, it being the normal practice of the Council not to make any comments on other reports. This is in line with the requirement in the Act that the Council should advise the Minister on " general matters relating to the services provided under the Acts." The Council may, however, remit matters to the Standing Advisory Committees and obtain reports from them in the same way as they would if they were committees of the Council, and the Committees, themselves, may decide to send a particular report to the Council rather than to the Minister if they think it raises wider issues than those with which the Committee are primarily concerned.

The dual duty laid on the Standing Advisory Committees of advising the Minister and the Central Council gave rise to a sharp difference of opinion in the Council on the composition of the Medical, Dental, Pharmaceutical and Ophthalmic Advisory Committees. Ultimately, the Council by a small majority recommended that there should be a small element of lay representation on these. This recommendation, however, was not accepted by the Minister who " considered that he should normally be able to look to those four Committees for purely technical advice, and that questions affecting the Medical, Pharmaceutical, Dental and Ophthalmic services as a whole should be discussed in full Council or in special committees of the Council." In order to secure co-ordination between the work of the Council and the Standing Advisory Committees, each of these contains a varying number of members of the Council ; thus, the Dental Advisory Committee is composed of the three dental members of the Council, ten other dental members and two doctors. The inclusion of the latter was the subject of much debate when the Committee was first formed, and it is still difficult to understand precisely what function these distinguished medical men are expected to exercise in a Committee whose concern is to give technical advice on dental matters.

The reports of the nine Standing Advisory Committees form Part II of the Report of the Council. The principal matters dealt with during the year by the Standing Dental Advisory Committee were dental services in hospitals, the dental health of children and ancillary workers. It has long been recognised that in too many hospitals the provision made for dental treatment was both incomplete and unsatisfactory. Precise information as to the nature and extent of the facilities provided was not, however, readily available, and the lack of this knowledge renders it difficult to formulate a practicable short-term policy of development either for the country as a whole or for individual hospitals. These considerations have led the Committee to advise the Minister to undertake " a pilot survey of the existing hospital dental services in terms of accommodation, staffing and equipment," and it is satisfactory to learn that this recommendation has been accepted by the

[1]His Majesty's Stationery Office, 1s. net.

Minister and the survey has already been put in hand. The knowledge gained from such a survey should render it possible to pursue a short-term policy aimed at the improvement of hospital dental services which would lead gradually to the fulfilment of the long-term policy outlined in the memorandum on Consultative Service issued by the Ministry of Health earlier this year. The Committee have realised that, in planning any such development, it is essential that Regional Hospital Boards should have the benefit of dental advice, and have accordingly advised the Minister to recommend to Regional Boards, who have not already done so, to appoint consultant dental advisers and dental advisory committees. In the existing circumstances, progress in the provision of hospital dental treatment must necessarily be slower than could be wished ; this renders it all the more important that the best possible use should be made of both personnel and the accommodation which are, or can be made, available—an end which is not likely to be attained unless those responsible for hospital administration have ready access to informed dental advice.

The paragraph of the report dealing with "ancillary workers" adds nothing to what is already known of the activities of the Committee in regard to the training of Oral Hygienists nor, since it relates only to matters dealt with in 1949, does it contain any indication of what are likely to be the views of the Committee on the New Zealand scheme.

The final paragraph of the report states that the Committee are reviewing the provision of orthodontic treatment, surveying the statutory agencies available for carrying out dental research and studying the organisation of refresher courses for general dental practitioners.

An appendix to the main report contains a schedule in which the advice given to the Minister by the Council and the various Standing Advisory Committees to the Minister is set out in tabulated form with a brief summary of the advice given on those matters to which reference is not made in the body of the report.

Effect has already been given to most of the recommendations of the Dental Advisory Committee, but it is interesting to note a negative recommendation that "The replacement of lost teeth by partial dentures should not be restricted at the present time by the application of formulæ for determining dental efficiency."

NOTES AND COMMENTS

A Well-earned Honour

MEMBERS of the dental profession will wish to extend their congratulations to Lord Webb-Johnson on the award to him by the Council of the Royal College of Surgeons of the Honorary Medal of the College. The award was made in recognition of his many generous acts and continued labours in the interests of the College throughout the eight years of his presidency of the College.

Demonstrations at the Annual Meeting

ONE of the outstanding features of the very successful Annual Meeting at Birmingham was the display of clinical cases and table demonstrations held in the Medical School buildings on the afternoons of July 12 and 13. Fifteen or twenty different clinical cases were shown each day, and were a representative selection from the hospitals of the Birmingham area. Their presentation was arranged in an admirable manner and they provided one of the most interesting features of the Meeting. The demonstrations numbered fifty-six, including six of special interest to public dental officers, which must be nearly, if not quite, a record number for an Annual Meeting. Of this number, forty-nine were presented by members of the staffs of dental schools, which, with three exceptions, were all represented by one or more demonstrators. The standard of all the demonstrations was particularly high, and it was pleasing to note the marked improvement in the quality of oral photography which has helped to make this possible. The use of acrylic resin models for the static demonstrations gave them æsthetic qualities which were unattainable in the past. A criticism which was heard was that it was impossible, even in two days, to cover adequately all the material displayed and it may be necessary in future years to extend the time during which demonstrations are on view. Throughout the two days large crowds were always to be found around the clinical cases, and looking at the acrylic resin representations of pathological conditions produced by the technical staff of Wordsley Hospital under Mr. J. S. Knight. Other demonstrations which proved very popular were the Royal Dental Hospital's "Traumatic Occlusion"; Mr. Trotter's "Gingivectomy by Short Wave Electrothermy"; the Manchester School's "Traumatic Injuries to Anterior Teeth"; and Birmingham's "Dental Histology and Pathology"; whilst Dr. Lindblom was still to be heard behind an interested crowd when all others had long since departed. All the individual demonstrators are to be thanked most heartily for their work in preparing their displays, and for

their untiring efforts during the meeting. The organisers are to be congratulated on the arrangements for what must have been one of the most successful demonstration meetings in the history of the Association.

Pay in the Services

THE Secretary of State for War recently announced that the rates of pay of medical officers and specialists in the Royal Army Medical Corps were being examined and that account would be taken of the average earnings of doctors under the National Health Service. A similar examination of the rates of pay in the dental branches of all the three Services is clearly overdue if recruitment to these is to be maintained at a proper level both of quantity and quality.

Australian Standards for Dental Materials

DURING the war years there was a considerable increase in the production of dental materials in Australia and facilities for testing these were developed by the Dental Materials Research Laboratory of the Melbourne University. In January 1947, this work was taken over by the Commonwealth Department of Health and re-established as the Commonwealth Bureau of Dental Standards. The Bureau, in addition to undertaking the testing of dental materials, has co-operated with the Australian Dental Association, universities and dental schools, associations of dental traders and manufacturers and other interested bodies in drawing up a series of standard specifications for dental materials. Three of these have now been issued. They deal respectively with dental mercury (A.D.S. No. T.1), dental amalgam alloys (A.D.S. No. T.2), and zinc phosphate cements (A.D.S. No. T.3). Each of these standards is related in its technical requirement to a corresponding specification of the American Dental Association and in the cases of alloy and dental cement to U.S. Federal Specifications. It will be noted that the specification of alloy does cover the composition. It is, however, stated in a footnote that an alloy containing silver 67 to 68·5 per cent ; tin, 26 to 27 per cent ; copper, 4 to 5 per cent ; and zinc 0·5 to 1·5 per cent should give satisfactory properties provided that the filings are properly annealed. Rules for testing amalgams and cements are set out in appendices to the relative specifications. It is laid down, for instance, that specimens of amalgam shall not exhibit an initial contraction greater than 0·04 per cent nor one more than 0·15 per cent 24 hours after preparation. The setting time of zinc phosphate cement should be within the range of 4–10 minutes and the ultimate compressive strength seven days after mixing not less than 840 kg. per sq. cm. (approximately 12,000 lb. per sq. in.).

The Medical Press

THE July 19 number of *The Medical Press* is a special issue devoted entirely to articles on dental problems written with the purpose of helping medical practitioners to understand and appreciate the part that the work of their dental colleagues can play in maintaining the health and well-being of their patients. Articles entitled Dental Caries, Unerupted Teeth, Periodontia, Dental Aspect of the Treatment of Clefts and Perforations of the Palate, The Deciduous Dentition and Some Aspects of Fractures of the Maxillæ have been contributed by R. Cocker, A. S. Moore, P. A. Trotter, K. P. Liddelow, B. C. Leighton and J. Hallam respectively. *The Medical Press* are to be congratulated upon their sagacity in choosing a subject so much in need of ventilation, and the contributors upon the lucid manner with which they have dealt with their subjects.

Medicine or Toilet Preparation

THE second report of the Joint Committee on the Definition of Drugs, appointed by the Standing Medical, Pharmaceutical and General Practitioner Advisory Committees in England and Wales and Scotland, which has been issued to all general practitioners taking part in the Health Service, throws an interesting side-light on one possible cause of the inflated costs of the pharmaceutical service. The difficulty of controlling demands for free medicines is illustrated by the fact that it should have been thought necessary to advise doctors that such things as bath salts, face powders, shaving soap and vanishing creams should not be prescribed since they are normally used as toilet preparations and not as medicines. Tooth powders and pastes are also classed as toilet preparations.

Change of Publication Day

THE Journal is in future to be published on the first and third Tuesdays in the month instead of the first and third Fridays. The next issue will therefore be dated Tuesday, September 5.

Fifty Years Ago

From the "Journal of the British Dental Association," August 15, 1900.

What I conceived to be the problem to be solved was, the designing and making of a spittoon and lavatory with arrangement for ample supply of hot and cold water, an ejector, a bunsen gas supply, and speaking tube communication between the operating-room and work-room or waiting-maid, and that all these desiderata should be contained in a compact and artistic form, and further, that all should be strictly sanitary in principle and construction. . . . The whole forms a compact apparatus, 36 inches in height and 22 inches in diameter, complete in all its parts, with all pipes out of sight, yet easily accessible, and the design is artistic and pleasing to the eye.

From a description by Mr. Thos. Headridge of a unit designed for use in his own practice. This was probably the forerunner of the modern unit.

LETTERS TO THE EDITOR

THE PILTDOWN SKULL

SIR,—In reply to the letter of Mr. Staple of August 4, 1950, I would refer him and other readers interested to the list of analyses of materials from Piltdown published by Drs. K. P. Oakley and C. Randall Hoskins in *Nature* (Vol. 165, March 11, 1950, page 381). The following values are listed.

	Fluorine %	P_2O_5 %	$\frac{\%\ F \times 100}{\%\ P_2O_5}$	*Iron* %
Eoanthropus I				
P. 1. L. parieto-frontal (E. 590)	0·1	21	0·5	7
P. 2. L. temporal (E. 591) ...	0·4	18	2·2	7
P. 3. R. parietal (E. 592) ...	0·3	17	1·8	6
P. 4. Occipital (E. 593) ...	0·2	28	0·7	5
P. 5. R. mandibular ramus (E. 594)	0·2	20	1·0	6
P. 17. Canine (E. 611) ...	<0·1	27	0·4	Trace
P. 42. Molar (rm_1) (E. 594)	<0·1	23	0·4	Trace
Eoanthropus II				
P. 30. R. frontal (E. 646) ...	0·1	13	0·8	12
P. 31. Occipital (E. 647) ...	0·1	17	0·6	17
P. 32. Molar (lm_1) (E. 648) ...	0·4	30	1·3	Trace

All the above fall into the 0·1 to 0·5 per cent of fluorine group.

Compare the above with :—

Holocene (Recent)				
P. 33. Fragment of fresh bone from soil	<0·1	33	0·3	Trace
P. 34. Pelvis, Bos taurus ...	<0·1	24	0·4	4
P. 35. Metatarsal, Bos taurus (E. 1388)	<0·1	27	0·4	2
P. 38. Ungual phalang, Bos taurus (E. 1389) ...	0·3	32	0·9	5

Mr. Staple questions my statement "That the published data of Oakley and Hoskins shows that the fluorine content of the Piltdown skull and mandible is of the same low percentage as that of the Piltdown Holocene (Recent)."

Dr. Oakley himself has observed:

"That the figures scarcely provide any differentiation between Eoanthropus and recent bones requires some explanation; but at least it serves to emphasise the probable enormous time-gap separating the former from the Lower Pleicestocene material." (*Nature*, March 11, 1950.)

That this is so is shown by the figures for P. 17—the canine tooth, and for P. 35—the ox metatarsal, which are identical in respect to fluorine and P_2O_5 content as well as to the ratio of the two, 0·2 per cent, 27 per cent, and 0·4 respectively.

74, *South Side*, Yours faithfully,
*Clapham Common, S.W.*4. A. T. MARSTON.

EARLIER ERUPTION OF TEETH

SIR,—I was very interested in the recent correspondence on the early eruption of teeth.

My daughter has a lower permanent canine through although she is not yet 7 years 11 months. She had an upper premolar erupting at 7 years 4 months. This was partly due to the early extraction of its predecessor, but no lower tooth has been removed.

There is a family history of early eruption. My wife's younger brother had a lower third molar erupt at 14 years 10 months.

106, *Manor Road*, Yours faithfully,
Wallington, Surrey. R. E. GOODRICH.

SIR,—One could by following Mr. Angelman's theory to its logical, or perhaps psychological, conclusion prove that the early eruption of teeth and the parodontal disease in the young that he mentions are due to the unhealthy moral influence of the films, the radio, and present-day literature, but I had hoped that correspondence on this subject would be kept to the simple issue as to whether there was sufficient evidence available to justify the abandonment of our earlier teachings.

In simple terms, am I to tell parents that it is necessary to endeavour to save the deciduous molars at all costs until the tenth to twelfth years, or the eighth to ninth?

Lewesdon, Yours faithfully,
Lyme Regis,
Dorset. ERNEST H. PHILLIPS.

THE DENTAL CURRICULUM

SIR,—The suggestion was made at the general meeting in Birmingham that the curriculum for the L.D.S. diploma may have to be reduced.

It must be obvious to any member of the B.D.A. that unless this is done dilution is certain in the very near future.

All members who, like myself, have taken Biology, Chemistry, Physics and Metallurgy know full well that these and other sections of the curriculum may be modified and the time spent on Dental Mechanics reduced.

Dental Mechanics is, or at least ought to be, the work of the dental technician.

Three years is quite long enough (with appropriate pruning) for any dental student.

Students in any event are bound to " fight shy " of the dental profession in its present most unsatisfactory position.

Yours, etc.,
" BANBURY CROSS."

Reviews and Abstracts

A TEXT-BOOK OF ORAL PATHOLOGY. Fourth Edition. By Thomas J. Hill, D.D.S., Professor of Clinical Oral Pathology and Therapeutics, Western Reserve University, Cleveland, Ohio. London: Henry Kimpton, 1949. Pp. 389. Price 37s. 6d.

Here is a book that will naturally commend itself to the student. It is written for the undergraduate. It is of handy size, in fact it is a small book if judged by modern dental textbook standards for it has just under four hundred pages. Also by modern standards it is very reasonably priced. It is generously illustrated, nearly as many illustrations as pages of text. The author and his former co-author, R. W. Bunting, are men with a fine international reputation. This is a fourth edition and a book which reaches this fortunate state after twenty years is surely reliable and in demand by students. At first sight then this book is just what the student requires, but he must be cautioned, for a closer examination reveals certain aspects not altogether in its favour as a textbook. Illustrations are used in such a book for several reasons. They have a definite psychological value and can

encourage the wearying mind to the end of the chapter. They can indicate at a glance the scope of the book. They make the book attractive and an attractive book is pleasant to read. Their main function however is that they are substitutes for long verbal descriptions. Pictures are meant to be used and studied in the same way as the text for they are part of the teaching that the book is offering. Most of the illustrations fail in this respect and the standard of photography and reproduction is surpassed by many other textbooks on the same subject. Not one of the histological illustrations, for example, gives an indication of the magnification, an important omission. Most do not give an adequate description of the cells and tissues demonstrated. No illustration has arrows, letters or symbols superimposed upon it to indicate the various important structures, in fact their identification almost requires a prior knowledge ; yet, this is an undergraduate textbook designed as an introduction to the subject and to supply the omissions of general textbooks of pathology. Another point—The thinking student might rightly be puzzled by the inclusion of an illustration from the works of Sir John Tomes. If no similar case has been reported since those days is there any great justification for emphasising so unusual a condition in a textbook for undergraduates ? And, with such a common condition surely a good clinical photograph could be obtained of lingua geographica. Another curious illustration is the radiograph of an impacted maxillary canine. This one is unique among such illustrations used in this book for its tone values are the reverse of all the others, the teeth are black and the oral cavity is white. One can only ask why ? On the whole the illustrations do not teach but are a passive adornment to the text. The lack of an internationally acceptable nomenclature with all the resultant disadvantages is once again apparent. The British student will read strange names and find unfamiliar classifications. As a companion to his lecture notes and as a source of their amplification he will probably experience considerable confusion in discovering the equivalent terminology in this volume. Once he has discovered his place, his difficulties, apart from the terminology in the text, are overcome for the text is reliable and authoritative. It reads easily and no criticism can be offered about the arrangement of the subjects. As must happen when a book sets out to be selective, each reader, according to his interests or curiosity, will feel that this or that subject has been treated superficially. This is largely an individual point of view and, while admitting certain sections are lacking in detail, the reviewer wishes to emphasise that the basis and essentials are here. Rightly the main emphasis has been placed upon the dental aspects of pathology. What does require mentioning however is the scanty reference to recent British contributions. The discoveries and experience of our leading authorities on oral pathology are ignored. The reader will look in vain for references to the work of Fish, Rushton or Stones, to mention only three of our prominent men. In the excellent chapters on caries allusion is made to the work of Lady Mellanby and Weaver. By and large, however, the main British references are to work carried out in previous generations. It would appear that the book was designed for American students and the requirements of students in Britain had no place in the thoughts of the author when the first edition was written or when the third edition was revised.

ZAHNAERZTLICHE PROTHESE UND MUND-HOEHLEN-CARCINOM. By Max Spreng, Dr. med. Professor fuer Zahnheilkunde an der Universitaet Basel Vorsteher der prothetischen Abteilung ; Fritz Gasser, Dr. med. et Dr. med. dent., Oberassistent an der prothetischen Abteilung ; and Ernst Oppikofer, Dr. med., P.D., fuer Oto-Laryngologie. Verlag Birkhaeuser, Basel. 1949. Pp. 192. Price : Swiss francs 23.50.

Spreng and his co-workers in this book stress the necessity for a better knowledge of prosthetic denture materials and their influence on the oral tissues. They also insist on the need for close co-operation between the dental surgeon, physician and chemist. Prosthetics not only comprise the " manufacture " of dentures ; the dental surgeon must also study and watch the reaction of living tissue to dead material. Statics also play an important part, if the dental surgeon looks at the prosthesis not as " merchandise " but as a limb—an integral part of a living organism.

The different theories of carcinogenesis are discussed and special consideration is given to this problem in relation to the oral tissues.

A further chapter is dedicated to the reaction of oral tissues to the various materials used in prosthetics : vulcanite, metals and plastics. A special test method is described for those patients who are particularly sensitive to foreign material : for these cases a test plate is made, consisting of 3–4 different prosthetic materials ; this plate is worn for a few days and the reaction of the mucosa observed. Only a material which causes no reaction should be used for the final prosthesis.

A biopsy is indicated when any change of the oral tissues under or near a denture is observed. A series of excellent photomicrographs illustrates the text and many photographs of ill-fitting dentures and of the damage they have done to the oral tissues render the reading of this book very vivid.

A number of case histories show the importance of Spreng's insistence on close observation of the mucous membranes in order that a correct choice of prosthetic material, which will not damage the tissues, may be made.

The book finishes with six pages of international bibliography. It should be read by every dental practitioner and it should be regarded as a serious warning.

Dental Caries Experience in the Virgin Islands.—An investigation was made into the dental condition of the inhabitants of the island of St. Thomas in the Caribbean Sea. The economic level of the predominantly Negro population is comparatively low. The only water supply is provided by rain water collected from roofs and catchment areas. 823 subjects in age groups from 6 to 18 years were examined with mirror and explorer. The amount of conservative dentistry was negligible. The number of D.M.F. teeth per subject was substantially higher than in comparable age groups in various parts of the United States. The number of white children examined was small but the figures suggest that, as found in many other surveys, the incidence is higher among them than among Negro children.—SHOURIE, K. L., and MARSHALL-DAY, C. D. (1950) *J. Amer. dent. Ass.*, **40,** 315.

South African Fossil Hominoids.—In course of discussions on the evolutionary significance of the recently discovered fossil remains of Australopithecinæ, it has become clear that there is a fundamental disagreement between various workers on the question whether the dentition of Australopithecinæ is in general more hominoid than anthropoid. The point at issue is whether the major dimensions and indices of individual teeth can by themselves provide adequate information on which to base statements regarding affinities of primitive hominids and anthropoid apes. Professor Zuckerman maintains that comparison of the teeth of Australopithecinæ with those of three types of extant great ape using both (*a*) dimension by dimension and index by index, and (*b*) tooth by tooth, comparisons shows that almost every one of the fossil teeth can be matched in both dimensions and shape by corresponding teeth of extant great apes. He has also compared the dimensions of the fossil teeth with those of the Australian aboriginal, and with those of the Ancient Egyptian, respectively, a large- and a medium- to small-toothed "face" of Homo sapiens. From his results he concludes that in their dimensions the teeth of the African fossils resemble those of the two human types far less than they do those of existing apes. Professor le Gros Clark, however, is not in agreement with these findings. He considers that any comparative studies of such material should be made on a much wider basis than on the single tooth and should involve a survey of the total morphological pattern of the dentition which is made feasible now that such a large quantity of Australopithecine material is available. Moreover, he thinks that if the comparison is not to be misleading, the dentition of Australopithecinæ should be compared with the primitive hominids of the Pithecanthropus group from Java and China rather than with that of Homo sapiens of today. From his own comparative studies based on more than 400 ape skulls, Professor le Gros Clark concludes that the dentition of Australopithecinæ displays certain hominid features which find no precise parallel in any of the known apes (recent or extinct), and others which may very occasionally be found singly if diligently sought in a large series. He asserts that these conclusions are strengthened by studies of other parts of the skeleton of Australopithecinæ, and in particular, by the almost complete os innominatum which was actually found in situ at Sterkfontein.—Zuckerman, S. (1950) *Nature, Lond.*, **165**, 652; Le Gros Clark, W. E. (1950) *Nature, Lond.*, **165**, 893.

Changes in the Kallikrein Contents of Saliva under Physiological Circumstances and in Periodontoclasia.—Kallikrein is a hormone produced largely by the pancreas, but also to a less extent by the salivary glands which discharge it into the mouth in its active form. It has a vaso-dilatory effect and is constantly present in an inactive form in the blood. Active kallikrein exerts its effect upon the capillary walls. Where there is stagnation in the tissues and as a result the pH of the blood approaches acidity, kallikrein changes into the active form and increases the permeability of the capillaries. Its intravenous injection produces a sudden fall of blood pressure which quickly rises again because kallikrein is inactivated by the blood. It would seem probable that the active kallikrein of saliva could exert some effect upon the superficially situated capillaries of the oral mucosa. It is known that other substances easily pass through the oral mucosa into the blood stream. The kallikrein content of human saliva from which the solid matter has been removed by centrifuging can be assessed by its effect on the blood pressure of dogs when injected intravenously. The kallikrein content of 28 persons of ages ranging from 8 to 68 years was assessed in this way. The content did not seem to be influenced by the rate of flow of saliva or by the time of day but seemed to increase with age. Similar investigations were made on the saliva of six patients with parodontosis and the kallikrein content was found to be five or six times higher than in control patients of the same age. This increase is thought to be in keeping with the view that parodontosis is a condition of premature ageing of the parodontal tissues. There was no considerable increase in the kallikrein content of the saliva of a few cases of ulcerative gingivitis and predisposition to dental caries that were investigated. —Sallay, C., and Nador, C. (1950) *J. dent. Res.*, **29**, 232.

Kallikrein is a protein-like substance which is thought to be one of a group of substances the release of which in the blood stream may be responsible for the fall of blood pressure in surgical shock.—Ed., *B.D.J.*

The Toxicity of Fluorides in Relation to Their Use in Dentistry.—With the increased use of fluorides in dentistry users should be alert to the dangers of carelessness or misuse. Toxic effects of fluorine can be grouped under three headings, acute poisoning, chronic high-grade, and chronic low-grade poisoning. Fluorides rank among substances whose ingestion in small amounts can cause death in a few hours. Cases are on record, however, of survival after the consumption of a fluid ounce of 1 per cent solution of sodium fluoride. Larger amounts are apt to produce nausea with ejection of the poison from the stomach. The lethal dose for man is not firmly established. Roholm's statement that 4 gm. is the minimum amount of sodium fluoride known to have produced death of an adult is widely quoted. Probably the most important action of fluorine in producing toxic symptoms is its behaviour as a general protoplasmic poison which interferes with cell metabolism. In addition fluorides form strong complexes with calcium and a case of poisoning is on record which exhibited tetany and just before death the blood calcium was extremely low. The recommended treatment for acute poisoning is gastric lavage with lime water. Calcium gluconate may be given intravenously. The topical application of sodium fluoride, during which 2 ml. of 2 per cent solution may be used, is without risk if elementary precautions are taken. Even if the patient swallowed the whole amount there would be no physiological disturbance. The solution should, however, never be allowed in the patient's home where its accidental consumption by young children could lead to fatal results. The classical effects of chronic high-grade poisoning which sometimes occurs in industry are stiffness of joints, exostoses, moth-eaten bones, calcification of ligaments, and increased density of bone. These symptoms can arise in areas where the water supply contains large amounts of fluorine. It is, however, impossible to imagine circumstances in which the fluorine intake might become sufficient to bring about chronic high-grade fluorosis if the fluorine content of the water is of the order of 1 ppm. Nevertheless it appears possible for 1 ppm. fluorine in a water supply occasionally to produce mottling of the enamel, especially in hot climates where large amounts of water may be consumed. The consumption of fluorine-containing tablets as well would naturally increase the risk. It was thought that people living in areas of endemic fluorosis might have

sclerosed bones which might manifest themselves by an increased liability to fractures. This was not borne out by an investigation carried out on U.S. Army recruits. There is some evidence that fluorine in the water supply may have a beneficial effect on hearing. Fewer hearing defects were found among children in fluorine areas. A case has been reported of dermatitis arising on the fingers of a dentist using sodium fluoride for topical application.—G. J. Cox and H. C. HODGE (1950) *Journ. Amer. Dent. Assoc.*, **40**, 440.

Soft Tissue Lesions of the Mouth.—Gingivitis is generally caused by local factors but it should not be overlooked that occasionally underlying systemic conditions, such as diabetes, pregnancy, nutritional deficiency or allergy to sera may act as contributory or aggravating factors. Poisoning with heavy metals, the use of epanutin and penicillin may also contribute to the condition of the gingiva. Cases of Vincent's infection may turn out to be less simple. If the patient does not respond rapidly to treatment, blood dyscrasias should be considered. The first manifestation of hyperparathyroidism may be generalised loosening of teeth, a giant cell epulis or a central bone lesion. Where patches of pigmentation are present, Addison's disease should be considered, especially if they are of recent origin. Not infrequently skin conditions may manifest themselves with oral lesions. Reference is made to a case of pemphigus treated mistakenly as a desquamative gingivitis. Lichen planus may be mistaken for other lesions. Clinicians should be alert for tuberculous lesions in the mouth. They may develop before the pulmonary lesion is recognised. Syphilitic lesions may assume various and atypical forms in the mouth. The small papilloma or fibroma in the mouth may in rare instances prove to be a malignant lesion. A case is described in which a slight enlargement of interdental papilla was the only clinical evidence of ameloblastoma.—KALETOSKY, T. (1950) *Oral Surg.*, **3**, 240.

Dental Structure and Caries in 5-year-old Children Attending L.C.C. Schools.—The most recent of the series of dental examinations of 5-year-old L.C.C. schoolchildren started in 1929 was undertaken during 1949. It had been found that during the period 1929 to 1947 the dental condition as regards the tooth structure and caries had very much improved but it had not been possible to say at what rate the improvement had taken place nor whether it had been a regular one. The 1949 survey was of special interest because it might indicate whether the improvement continued. Unfortunately it was only possible to examine 691 children in the present survey in comparison with more than twice that number in the previous ones but an attempt was made to obtain representative samples from the same schools. As previously the statistics were based upon the average caries figure (A.C.F.) which takes into account the extent of the carious lesions, and the teeth were graded into four grades of quality of structure. It was found that the fall in the incidence of caries previously noted was not maintained, the incidence having in fact risen to approach that of 1943. The falling off in the quality of structure was not so great. Discussion of the factors which might have brought about retrogression is reserved until after the 1951 survey which will indicate whether it is merely a periodic fluctuation or marks the beginning of a progressive deterioration.—MELLANBY, H., and MELLANBY, M. (1950) *Brit. med. J.*, **i**, 1341.

Public Dental Service

CITY OF LEEDS EDUCATION COMMITTEE

SCHOOL HEALTH SERVICE REPORT FOR 1948

AN interesting report by Mr. D. E. Taylor, Senior Dental Officer, conveys that at the beginning of 1948 Leeds had its full establishment of dental staff and that plans had been made for additional staff to be appointed during the year. The introduction of the N.H.S. Act, however, not only prevented the augmentation of the School Health Service dental staff but also resulted in three of the existing dental officers resigning, and thereby severely curtailed the carefully planned progress of the dental services of this ambitious local authority.

It is pleasing, however, to note that during the year Professor T. Read was appointed as consultant oral surgeon, and Mr. H. Shaw as consultant orthodontist; that the M.C.W. dental service and school dental service (formerly run as separate and unco-ordinated services) were merged into one and that the dental laboratory work was made more extensive and its staff increased.

On the other side of the picture there is the fact that 23,000 children did not receive a dental inspection during the year—a position which suggests that for the year as a whole there was an overall shortage equivalent to not less than six whole-time dental officers. 25,298 fillings were inserted in permanent teeth during 5,533 treatment sessions and during these same sessions 5,536 permanent teeth and 20,672 temporary teeth were extracted, "gas" being given on 17,714 occasions.

The dental services in Leeds are undoubtedly well organised and it is a pity that shortage of staff should be preventing progress.

COUNTY BOROUGH OF BELFAST

SCHOOL DENTAL OFFICER'S REPORT 1948

SHOULD professional archivists of 2048 be doing any historic research, this year (1948) of dental revolution will be of focal interest. Here is one report for them which has left little to chance. There is hardly a single phase of a peak year's work which cannot be assessed in terms of arithmetic. Seven pages, foolscap size, of carefully assembled analytical tables enforce a respectful, if somewhat envious, admiration for such Wisdenic industry. A staff of one senior officer and ten colleagues inspected during the year all the schools for which their authority is responsible, 160 of them, a splendid achievement, one might almost say unique, for this particular year. They examined 1,166,803 teeth belonging to 52,464 children during 384 sessions. Every head teacher can see listed the individual score of clinic attendances by, and the number of treatments given to, their charges. Of a total number of 60,545 notified for inspection, only 7 refused. The Senior Medical Officer observes "there is ample evidence that the potentialities of the service are limited merely by the lack of accommodation and the necessary professional staff." Those potentialities are evidenced by a 11·3 per cent increase of total treatments over 1947, attaining the highest figure in the history of the service. In going through the long list of schools, and what fascinating names some of them have, "Star of Sea Boys," "Star of Sea Girls," "Model Boys," "Model Girls," the writer was attracted by the curious case of the last two schools. They have quite interesting comparative figures.

School	Total on Rolls	Children attending Clinic	Total Clinic attendances	Total Treatments
Model Boys'	502	144	515	491
Model Girls'	504	217	740	813

There is probably a very simple explanation of this statistical disparity. On the treatment side, the year's figures are impressive. A sessional average of 7·5 fillings yielded a total of 23,750. Extractions numbered 24,667 in 615 operative sessions, general anæsthesia being administered in 11,300 cases. It is obvious that not only have the Belfast staff pulled their full weight but they have a skilled statistical staff to record it. It might be a useful object lesson to their local authority, and to the central authority, if an additional comparative abstract were made out showing what all their work would have cost under general dental service conditions. The pace of criticism directed at the tragic deterioration of the school dental service is quickening and legislative authorities might be decisively influenced if it could be proved that the set up is just abysmal nonsense on economic grounds. This report is very much to be admired for its wealth of detail, but it does raise an issue as to the relative value of these annual expositions. A few years ago, a ministerial authority stated that all the public dental service statistics required, if kept simply and progressively throughout the year, could be assembled on January 1, on the back of a postcard. Nevertheless, in the compilation of an ideal report, regard must be paid to all the various hands into which the document may fall. The present report can be studied with profit and enjoyment, and the staff concerned are to be congratulated on a fine year's effort.

BOROUGH OF KEIGHLEY—"EXCEPTED DISTRICT"

SCHOOL HEALTH SERVICE ANNUAL REPORT FOR 1948

FOR education purposes the Borough of Keighley is an "Excepted District" under the West Riding of Yorkshire Local Education Authority, and the borough School Medical Officer (Dr. H. M. Holt) has issued a separate report on the work of the School Health Service within the borough during 1948.

The school population is not specifically stated but it would appear to be in the neighbourhood of 7,000. Two whole-time School Dental Officers (Mr. B. S. Clay and Mr. E. S. Midgley) are employed and the dental section of the report is preceded by the words: "The Dental Surgeons furnish the following report." From such an introduction it can only be assumed that the borough has no Senior Dental Officer.

The manner in which the dental report is set out could be improved and it would certainly assist the reader to form a more accurate and complete picture of the dental service if the statistics relating to pupils attending secondary schools could be included as normal statistics in the main tables. As it is, there is an unnecessary and confusing overlap of statistics relating to children in the age groups from 8 to 15 inclusive.

With a staff of two whole-time dental officers for approximately 7,000 children one would expect to see a high incidence of conservative treatment as compared with extractions and this expectation was certainly fulfilled at Keighley during 1948. 2,730 individual children were treated; fillings in permanent teeth numbered 3,918 but extractions of permanent teeth numbered only 431. Other items of treatment for school children included 16 completed orthodontic cases, 27 partial dentures supplied, 27 X-ray examinations, 124 scalings, and 12 gold inlays.

Dental News

SCHOOL SERVICE IN LONDON

REPLYING in the House of Commons to a question asked by Lieut.-Colonel Lipson, Mr. Tomlinson said that the London County Council and other local education authorities did not as a rule find it practicable to employ substitutes for dental officers who were temporarily absent. In those circumstances, emergency cases in London were usually referred to the nearest available clinic, or, if the absence is prolonged, arrangements may be made for the dental officer of another clinic to attend once or twice a week for emergency work. Lieut.-Colonel Lipson asked in a Supplementary Question whether the Minister was aware that the Brixton treatment centre, which was normally open for 11 sessions weekly, had had to close completely because the dentist was away ill and that the present ten weeks' waiting list in near-by centres was bound to increase in consequence.

Mr. Tomlinson replied that they knew the difficulties and were doing all they could to expedite a solution of the problem which would enable them to put the service on a better footing.

SCHOOL DENTAL SERVICE

THE Finance Committee of the Manchester City Council have recommended that the salaries of school medical and dental officers should be increased to a maximum of £1,000 per annum. The present maximum for dental officers is £835 and that for medical officers £935. The establishment of dental officers is eighteen and the present strength eight.

A report to the Warwickshire Education Committee states that the dental staff is reduced to five full-time and two part-time officers, compared with an approved establishment of eighteen full-time and one part-time officers.

GERMAN DENTISTS IN AFRICA

THE Colonial Secretary, in a written Parliamentary answer to Mr. Sorensen who asked why medical practitioners with German qualifications were allowed to practise in Tanganyika and the Cameroons but not in the Gold Coast, Nigeria and other Colonies, said there were no special rules about German qualifications as such. In most Colonial Territories, doctors from outside who wished to practise were required by law to have qualifications recognised by the General Medical Council of the United Kingdom. The law in the former Mandated Territories, however, gave the local authorities discretion to register practitioners with other qualifications. The recruitment of foreigners for the Government medical services in the Colonies was obviously not free from difficulty, but a number of foreign doctors and dentists had been appointed during the last two or three years. Most of them had obtained British registration.

MEDICAL OFFICERS' SALARY CLAIMS REFERRED TO ARBITRATION

THE claims of medical officers employed by local authorities for a revised scale of salaries and the counter proposals of the Management side have been under discussion in Committee "C" of the Medical Whitley Council from March 16 to July 24, but it has not been possible to reach agreement. It has now been agreed, on the request of the Staff side, that the difference between two sides should be reported to the Ministry of Labour for reference to the Industrial Court.

ANALYTICAL CHEMISTRY AT THE SCIENCE MUSEUM

A SPECIAL display of old and new apparatus used in chemical analysis is on view at the Science Museum, South Kensington, until September 10.

The exhibition has been prepared in co-operation with Government departments and the leading instrument makers. Its purpose is to show the development of modern refined methods of analysis. Some of the apparatus is shown working and by means of a push-button demonstration visitors are able to bring radioactive specimens in turn in front of a device for measuring their activity. Microbiological analysis is another new technique demonstrated, its principles being explained with the aid of laboratory specimens.

The exhibition is presented in a form suitable for the general public as well as specialists. The Science Museum is open from 10 a.m. to 6 p.m. on weekdays and from 2.30 p.m. to 6 p.m. on Sundays.

DENTISTS' PROVIDENT SOCIETY

Annual General Meeting

THE Forty-second Annual General Meeting of the Members of the Society was held at the registered address, 13, Hill Street, Berkeley Square, London, W.1, on May 24, 1950, Mr. S. A. Riddett presiding.

The Chairman said that the membership, at the end of 1949, stood at 2,965 and since the beginning of this year it had passed the 3,000 mark. It was essential to their progress that they recruited each year a sufficient number to make good the normal wastage and to maintain a steady increase. Each year now brought about a bigger percentage in the number retiring for age, during the year under review no less than 27 came under that heading.

Mr. V. W. Humpherson (Treasurer) said he was happy to be able to tell them that the Society had once again enjoyed a successful year. Contrary to the experience of the majority of societies, payments for sickness benefit remained at their average level. The Subscription Income showed an increase of £5,000 and expenses had again absorbed only 4·5 per cent. They had also been able to transfer a sum of £1,000 from the Dentists' Insurance Committee which was equivalent to an additional apportionment of just under 6d. per share.

In the Members' Capital Account the main item was that of payments to members at age 65 which showed a considerable increase totalling £24,000 as against £16,000 in 1948. On the other hand, sums paid to members withdrawing were substantially reduced, being less than half the amount for the previous year. The Executive had been particularly pleased at being able to maintain interest at 4 per cent, pay an apportionment of 27s. 6d. and still be able to transfer £2,600 to Reserve Fund.

The only other item to which he thought they need refer was the sum advanced to members by way of mortgage loans. Although the majority were paid off before reaching maturity, these loans were a great help to members and formed an excellent investment for the Society. All available capital was being utilised in this way.

Concluding, Mr. Humpherson said he would like to place on record the indebtedness of the officials for the able assistance they received from the permanent staff at all times. He would also like to express, on behalf of members, their warm thanks for the work which had been carried out during the past year.

The Report for 1949 was adopted.

The retiring officers were re-elected as follows: Chairman, Mr. S. A. Riddett; Vice-Chairman, Mr. J. Warren Harvey; Hon. Treasurer, Mr. V. W. Humpherson, and Mr. H. Parker Buchanan was elected a member of the Committee to fill the vacancy caused by the death of Mr. G. P. Monk.

THE HOSPITAL SERVICE PLAN

for the Private Patient

FROM A CORRESPONDENT

THROUGH this voluntary mutual-aid Scheme, initiated by King Edward's Hospital Fund in collaboration with the hospitals and the British Medical Association in 1943, the expenses of hospital private ward and nursing home treatment and the maintenance charges, medical or surgical fees for private services involved, are recoverable up to a maximum of £210 per year.

The scheme is administered by the London Association for Hospital Services, Tavistock House (South), London, W.C.1 (Euston 5166), and the Council of Management comprises representatives of the British Medical Association, King Edward's Hospital Fund, the Royal College of Physicians, the Royal College of Surgeons, and the Royal College of Obstetricians and Gynæcologists.

There are two important reasons why this Plan is of considerable interest to members of the dental profession. Firstly, for those who would prefer for themselves and members of their family, hospital private ward accommodation or treatment in a nursing home, where in either case they can choose the surgeon or physician to attend them, membership is an investment, and removes the anxiety of wondering how and where to obtain hospital in-patient treatment quickly and with privacy, without financial strain. Secondly, the Plan is complementary to the National Health Service, and includes benefits for the expenses of private dental treatment, when the member is treated as an in-patient in a private ward or a nursing home.

Being non-profit making substantial benefits are given in return for a most moderate subscription.

Typical benefits are: Surgeons' fees, major operation up to £52 10s., intermediate operation up to £27 6s.; anæsthetist services up to £6 6s.; radiodiagnostic service up to £12 12s.; radiotherapy up to £50 8s.; hospital pay-bed or nursing home charges up to £88 4s.

Membership is open to everyone under 60 years of age in the United Kingdom, and the benefits are given for treatment in any hospital or recognised nursing home in the world. There is no age-limit for the continuance of enrolment.

The annual contribution rates are: individual subscriber £5 4s., subscriber and one dependant £8 8s., subscriber and one adult dependant and all children under 18 £10 10s. (payable monthly, quarterly, half-yearly or yearly).

It is important also to note that the benefits are available to members irrespective of any sickness and accident indemnity insurance available from other sources.

The Secretary of the London Association for Hospital Services will gladly send full details to any member of the B.D.A. on request.

The Schools

THE ROYAL DENTAL HOSPITAL OF LONDON

A LECTURE on the Aboriginal Children of Central Australia is to be given by Mr. John Heath, L.D.S., of Melbourne, at the Royal Dental Hospital, Leicester Square, London W.C., on Wednesday, September 13, at 5 p.m. The lecture is open to all persons interested.

The Annual Prize Distribution of the School is to be held on Friday, October 6, at 8 p.m. Sir Cecil Wakeley, *K.B.E., C.B.*, President of the Royal College of Surgeons of England, will present the awards.

The Annual Clinical " At Home " of the School will take place on Saturday, November 25, and the Annual Dinner of past and present staff and students of the Hospital and School will be held at the Savoy Hotel on the evening of the same day at 7 p.m. for 7.30 p.m.

Examination Results

University of Manchester.—*D.D.S.*—H. F. Atkinson, *M.B.E.*, M.Sc., L.D.S.; A. S. Prophet, B.D.S., Dp.Bact. *M.Sc.*—P. Saunsbury, L.D.S.

The Services

National Rifle Association.—At the Imperial Meeting of the National Rifle Association held at Bisley from July 10 to 22, Major S. E. Johnson, Royal Army Dental Corps, shot for the Regular Army in the Inter-Services Competition and for England in the National Competition—being a member of the winning team in each case. He has been appointed Captain of the English team for next year. At the same meeting, Mr. C. Laceby Stevens won the Duke of Gloucester competition with a score of 74 out of a possible 75 at 600 yards; the skilled shot competition with a score of 145 out of 150; the National Rifle Association Cup, 49 out of a possible 50 at 600 yards; and the Donald Smith cup for which his score was 100 out of a possible 105.

Obituary

HUGH LLOYD WILLIAMS, M.R.C.S., L.D.S.Eng.

RETIRING from practice in 1933, H. Lloyd Williams, who died July 1950, will be remembered only by a few. He obtained his L.D.S. in 1885 and the M.R.C.S. in 1886 and joined the Association in 1888—remaining a member for fifty years.

He was J.P. for the County of Middlesex and for his native County of Caernarvon, Dental Surgeon at the Royal Dental Hospital and Consulting Surgeon and Lecturer at the Post Graduate College West London Hospital. In his hospital work he made scrupulous cleansing of the mouth before operation in all cases a routine treatment against post-extraction hæmorrhage, and the careful records which he kept over many years afforded ample proof of the soundness of this procedure. This subject provided the main theme of his Presidential Address to the Metropolitan Branch of the B.D.A. in December 1925.

The late Montagu Hopson moving a vote of thanks to him at the conclusion of his presidential year said of him: "H. Lloyd Williams has proved a most admirable chairman, not only at meetings of the Branch but also at the council meetings, having shown great tact in the exercise of his office, and he has never failed in his duties. The Branch were also indebted to Mrs. Lloyd Williams for the very successful social evening." This is the memory which H. Lloyd Williams and his wife left in the Branch among those whose pleasure and privilege it has been to have known them. He was elected President of the Odontological Section of the Royal Society of Medicine, 1911–12.

Charles Kynock Butchart, L.D.S.Edin., of Skipton, died on July 25, aged 70. He qualified from Edinburgh Dental School in 1901 and joined the B.D.A. in 1903. He leaves a widow, a daughter and a son, J. E. K. Butchart, who practised with his father.

Eric Yates Middleton, L.D.S.Sheff., of Hoyland, Barnsley, died last month at the age of 44. He qualified in 1928 and was elected a member of the B.D.A. in 1947. He leaves a widow and 2 children.

Thomas William Stark, L.D.S.Eng., of Darlington, died recently at the age of 79. He was a schoolmaster for some years before entering the Royal Dental Hospital. He qualified in 1913.

Personalia

Chief Dental Officer, Middlesex.—Mr. J. V. Bingay, L.D.S.Eng., has been appointed Chief Dental Officer for Middlesex at a salary of £1,300 per annum. He entered the service of the County Council in 1927 and has been Dental Officer of Area 10 since April 1949.

The South Western Regional Hospital Board announce that Mr. Hanbury Hazell, L.D.S., has been appointed Senior Hospital Dental Officer whole time in the Bristol Clinical Area, and Mr. A. E. Parrott, L.D.S.. Senior Hospital Dental Officer part time in the South Somerset Clinical Area.

Births

HORNSBY.—On August 11, 1950, at St. Andrew's Nursing Home, to Marjorie, wife of John Hornsby, L.D.S.U.Brist., "The Lychgate," 15, Scuthmead Road, Bristol, a son (David John), brother for Peter.

WILSON.—On July 28, 1950, to Anne Elizabeth (*née* Porter), wife of H. E. Wilson, L.D.S. (Q.U.B.), Sevenoaks, Kent, a daughter—Helen Mary.

Marriage

ENGEL—ELLISON.—On July 21, 1950, at St. Margaret's at Cliffe Church, Kent, Herbert Terry, only son of Monsieur and Madame Hugo Engel of Paris, to Frances, younger daughter of the Reverend R. W. M. and Mrs. Ellison of East Painton Vicarage, Co. Durham.

Our Diary

Wednesday, September 13.

Royal Dental Hospital.—Lecture, " The Aboriginal Children of Central Australia," Mr. John Heath (Melbourne), 5 p.m. All persons interested are invited.

BRITISH DENTAL JOURNAL

Communications with regard to editorial business should be addressed to THE EDITOR, *BRITISH DENTAL JOURNAL*, 13, Hill Street, Berkeley Square, London, W.1. Telephone: Grosvenor 2761. Telegrams: "Bridendon," Audley, London.

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